



JSPM's
RAJARSHI SHAHU COLLEGE OF ENGINEERING
TATHAWADE, PUNE-33
(An Autonomous Institute Affiliated to Savitribai Phule Pune
University, Pune)



DEPARTMENT OF CIVIL ENGINEERING

Department of Civil Engineering
B.Tech. Structure
(2023 Pattern)



Department of Civil Engineering

Vision

“To provide an excellent academic environment for students to become competent Civil Engineer.”

Mission

- To reinforce the students with fundamentals in Civil Engineering by providing scholarly and vibrant environment for successful careers.
- To explore and develop innovations that contributes to higher education, research and entrepreneurship development in applied domains of Civil Engineering.
- To serve society through knowledge and expertise in Civil Engineering.



Civil Engineers: Trusted Leaders for a Modern World:

Entrusted by society to create a **sustainable world** and enhance the global quality of life, **civilengineers** serve **competently**, **collaboratively**, and **ethically** as **master**:

- **Planners, designers, constructors**, and **operatorsofsociety'seconomic** and **socialengine**—the built environment
- **Stewards** of the natural environment and its resources
- **Innovators** and **integrators** of **ideas** and **technology** across the public, private, and academic sectors
- **Managers** of **risk** and **uncertainty** caused by natural events, accidents, and other threats and
- **Leaders** in **discussions** and **decisions** shaping public environmental and infrastructure policy.



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Program Outcomes (POs)

Engineering Graduates will be able to:

- 1.Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
 - 2.Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
 - 3.Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
 - 4.Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
 - 5.Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
 - 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- JSPM's Rajarshi Shahu College of Engineering Department of IT Engineering
- 7.Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
 - 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
 - 9.Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
 - 10.Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
 - 11.Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
 - 12.Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs):

Upon successful completion of UG course in Civil Engineering, the students will attain following Program Specific Outcomes:

1. Satisfy the essentials in planning, analysis, design and maintenance of Civil Engineering Structures by incorporating latest technologies and modern tools.
2. Proficient in identifying and solving complex infrastructural problems, applying management and engineering techniques.
3. Provide sustainable solutions to environmental and water resources challenges.



Highlights of the Syllabus

Curriculum of Civil Engineering Department is designed in consultation with:



Academic
Experts



Distinguished
Alumni



Industry/Corporate Experts

The curriculum of the UG Program of **Civil Engineering** designed in association with the **Bentley Systems**, **Builders' Association of India, Pune**, and **Builders Association of India (BAI)**.





Unique features of the curriculum

1. Curriculum centered at Outcome Based Education:

The new Curriculum is based on student-centered instruction models that focus on measuring student performance through outcomes. The outcomes include subject knowledge, industry required skills and attitudes.

2. Emphasize on Fundamentals:

The nature of the new curriculum is rigorous and well prescribed so that the students can spend more time on preparation and self-study. The students have to learn core subjects, solve practical based assignments and must attempt periodical quizzes. This will benefit them to grasp and keep a strong hold on fundamentals of Engineering in the most effective way.

3. Experiential Learning:

The curriculum emphasizes on hands-on sessions along with theoretical information. The new curriculum considers Problem Based Learning (PBL) as a teaching pedagogy and includes different subjects that encourage the students for hands on learning through virtual labs, mini-projects, etc. Accordingly, the curriculum maintains good balance between theory and laboratory credits.

4. Promote Creativity and Innovation:

Along with experiential learning, the curriculum also motivates the students to inculcate creativity and innovation. Apart from conventional lab, the curriculum provides a freedom for students to perform industry assignments, pilot projects, innovative development, etc.

5. Inculcating Ethics and Values:

To improvise student's behaviour, the curriculum has included systematic courses on ethics and values. The moral principles can help students to make right decisions, lead their professional lives and become ethical citizen.

6. Blend of Curricular and Non-curricular Activities

The curriculum also gives importance of different activities like co-curricular, extra-curricular, sports, culture, etc. This will help to do all round development of students in all possible ways.

7. Four Tracks in B-Tech:

The curriculum provides four tracks by offering various courses/electives/ flexibility in choosing mentorship to work in specialized field in the curriculum as,

I. Capstone Projects

II. Entrepreneur

III. Research and Higher Studies.

IV. Industry Internship

8. Global Competence:

The curriculum provides a unique opportunity for students to learn and engage in open and effective interaction with people from diverse and interconnected world. The combination of foreign languages (German, Japanese, and English) and international internships in the curriculum help the students to build a capacity to examine global and intercultural issues and to propose perspectives and views.

9. Industry Induced Internship Program

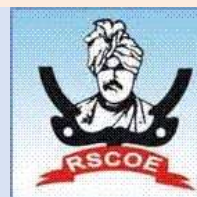
To support ever demanding industry requirements, the curriculum has included an industry internship with an objective to learn technologies pertaining to their discipline and enhance their technical knowledge with a support of the live platform of Industry.

10. Motivation for Self-Learning:

The curriculum also offers a freedom to students to take the initiatives in their learning needs and set the goals with the help of online learning platforms like MOOCs, NPTEL, Swayam, etc.



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Course Type Abbreviations

BSC: Basic Science Course

ESC: Engineering Science Course

PCC: Programme Core Course

PEC: Programme Elective Course

MDM: Multidisciplinary Minor

OE: Open Elective

VSEC: Vocational and Skill Enhancement Course

HSSM: Humanities Social Science and Management

AEC: Ability Enhancement Course

IKS: Indian Knowledge System

VEC: Value Education Course

CEP: Comm. Engg. Project

FP: Field Project

CC: Co-curricular Courses

Abbreviations:

L – Lecture, T – Tutorial, P – Practical, Hr – Hours, C – Credits, TuT – Tutorial, ISE – In Semester Evaluation, MSE – Mid Semester Evaluation, ESE – End Semester Evaluation



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S. Y. B. Tech. (Civil Engineering)
Academic Year -2024-2025 (Semester –III)
(Level 5 - UG-Diploma/ Diploma-Engg.) -Semester III

Course	Course Code	Course	Teaching Scheme				Credit C	Examination Scheme				Total Marks	Ownership
			L	T	P	Hr		ISE	MSE	ESE	TW		
PCC	CE2201T	Solid Mechanics	3	-	-	3	3	20	30	50	-	100	Civil
PCC	CE2201L	Solid Mechanics lab	-	-	2	2	1	ISCE: 30		20	-	50	Civil
PCC	CE2202T	Building Materials and Construction	3	-	-	3	3	20	30	50	-	100	Civil
PCC	CE2203T	Geotechnical Engineering	3	-	-	3	3	20	30	50	-	100	Civil
PCC	CE2203L	Geotechnical Engineering Lab	-	-	2	2	1	ISCE: 30		20	-	50	Civil
PCC	CE2204T	Fluid Mechanics	3	-	-	3	3	20	30	50	-	100	Civil
PCC	CE2204L	Fluid Mechanics Lab	-	-	2	2	1	ISCE: 30		20	-	50	Civil
AEC	HS2203T	Universal Human Values and Ethics	2	-	-	2	2	20	30	50	-	100	Humanities
BSC	ES2201T	Engineering Mathematics III	3	-	-	3	3	20	30	50	-	100	Humanities
VSEC	CE2205T	Innovation and Entrepreneurship	2	-	-	2	2	20	30	50	-	100	Civil
Total			19	0	6	25	22					850	

Notes:

For Theory courses: There shall be MSE, ISE and ESE. The ESE is a separate head of passing.

For Lab courses: There shall be continuous assessment (ISCE). The ESE is a separate head of passing.



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S. Y. B. Tech. Civil Engineering
Academic Year -2024-2025 (Semester –IV)
(Level 5 - UG-Diploma/ Diploma-Engg.) -Semester IV

Course	Course Code	Course	Teaching Scheme				Credit C	Examination Scheme				Total Marks	Ownership
			L	T	P	Hr		ISE	MSE	ESE	TW		
PCC	CE2206T	Concrete Technology	2	-	-	2	2	20	30	50	-	100	Civil
PCC	CE2206L	Concrete Technology lab	-	-	2	2	1	ISCE: 30		20	-	50	Civil
PCC	CE2207T	Building Planning and Architecture	3	-	-	3	3	20	30	50	-	100	Civil
PCC	CE2207L	Building Planning and Architecture Lab	-	-	2	2	1	ISCE: 30		20	-	50	Civil
PCC	CE2208T	Analysis of Structures	3	-	-	3	3	20	30	50	-	100	Civil
PCC	CE2209T	Surveying and Geomatics	3	-	-	3	3	20	30	50	-	100	Civil
PCC	CE2209L	Surveying and Geomatics Lab	-	-	2	2	1	ISCE: 30		20	-	50	Civil
MDM	CEM2201T	Multidisciplinary Minor I	3	-	-	3	3	20	30	50	-	100	Other Department
VSEC	CE2210L	Introduction to Python programming	-	1	2	3	2	ISCE: 30		20	50	100	Civil
HSSM	HS2205T	Economics	2	-	-	2	2	20	30	50	-	100	Humanities
CC	CE2211L	Co-Curricular Course-II	-	-	2	2	1	ISCE: 30		20	-	50	Respective Department
Total			16	1	10	27	22					900	

Notes:

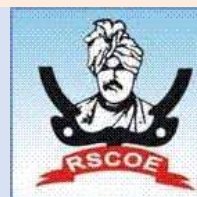
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For Lab courses: There shall be continuous assessment (ISCE). The ESE is a separate head of passing.

Multidisciplinary Minor I	
Course Code	Course Name
CEM2201T	Basic Civil Engineering



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List of Exit Courses after completion of Semester III and IV

1. Exit option is available for students those who have earned the total 88 credits at the End of fourth Semester.
2. Student who wants to avail the exit option after second year have to earn additional 8 credits from the list of courses shown below.
3. These courses student have to complete within summer vacation after 2nd Year.
4. After fulfilment as mentioned in 1 to 3 above, Students can earn **UG-Diploma/ Diploma-Engg** and same will be issued by the Institute.

Sr. No.	Course code	Name	Credits
1.	EX-CE2101	Fundamentals of structural Design	2
2.	EX-CE2102	Quantity Survey and Estimation	2
3.	EX-CE2103	Transportation	2
4.	EX-CE2104	Environmental Engineering	2



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S. Y. B. Tech
Academic Year – 2023-2024 Semester -III
[CE2201T]: Solid Mechanics

Teaching Scheme: TH: 3 Hours/week	Credit 3	Examination Scheme: In Sem. Evaluation: 20M Mid Sem. Exam : 30M End Sem. Exam : 50M
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Course Prerequisites:

Centroid and center of Gravity, Trigonometry and Geometry Basics, Beam Reactions

Course Objective:

To develop the ability to understand simple, flexural, shear stresses, bending moment, buckling load and deflection in various structural elements to apply the concepts to engineering problems.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Calculate stress and strain in determinate and indeterminate structures.

CO2: Calculate shear force and bending moment diagrams for beams.

CO3: Estimate the bending stress and shear stress in beam.

CO4: Calculate the torsional and principal stresses and strain in structural members.

CO5: Analysis axially and eccentrically loaded Columns.

CO6: Determine slope and deflection of determinate beams.

Course Contents

UNIT-I	Simple Stresses and Strains	06 Hours
Concept of stress and strains (Linear, lateral, shear and volumetric), Generalized Hook's law, Stress- Strain curves for brittle e and ductile materials. Elastic Constants and their relationships, stresses, strains and deformations in determinate and indeterminate structure for homogeneous and composite structures under concentrated loads, self- weight and temperature changes..		
UNIT-II	Shear Force and Bending Moment Diagram	06 Hours
Concept of Shear force and bending moment of different type of loading and beams. Loading diagram from SFD and BMD. Relationship between rate of loading, shear force and bending moment, Concept of zero shear force, Maximum bending moment, point of contra flexure		
UNIT-III	Bending and Shear stresses	06 Hours
Determination of Moment of Inertia for various cross sections. Stress due to bending: Theory of pure bending, flexure formula, and Bending stress distribution diagram, Moment of resistance and section modulus. Shear stress in beam: Concept of shear, Shear stress distribution diagram, concept of average shear Stress; shear connectors.		
UNIT-IV	Torsion , Principal stresses and Strains	06 Hours

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Theory of Torsion, Numerical on shaft subjected to twisting moments. Normal and shear stresses on any oblique planes and concept of principal planes and principal stresses by analytical and graphical method by Mohr's circle. Strain Gauges

UNIT-V	Axially and eccentrically loaded columns	06 Hours
Concept of critical load and buckling, Euler's formula for column with hinged ends, equivalent length for various end conditions, Rankin's formula, Limitations of Euler's formula, Safe load on column. Direct and Bending stresses for different structural members (axially and eccentrically loaded). Concept of middle third rule of different sections		
UNIT-VI	Fundamentals of Structure, Slope - Deflection of determinate beams	06 Hours

Basic concepts of Structural Analysis – Types and Classification of structure based on structural forms. Concept of indeterminacy and degrees of freedom -Static and Kinematic degree of Indeterminacy. Slope and deflection- Relationship between moment, slope and deflection, Macaulay's method. Use of these methods to calculate slope and deflection for determinant beams.

Text Books:

T1 Timoshenko, S. and Yung, D. H., "Strength of Materials", 3rd ed. East West Press.
T2 Dr. R.K.Bansal, "Strength of Materials" 6th ed. Mechanics of solids, Laxmi Publications.

Reference Books:

- R1. Subramanian, R., "Strength of Materials", 3rd ed. Oxford Higher Education.
- R2. Bhavikatti, S. S., "Strength of Material", 4th ed. Vikas Publication.
- R3. Gambhir, M. L., "Fundamentals of solid Mechanics", PHI Learning 2009.
- R4. Bhavikatti, S. S. "Structural Analysis 1", 4th ed. Vikas Publication.



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S. Y. B. Tech
Academic Year – 2023-2024 Semester -III
[CE2201L]: Solid Mechanics Lab

Teaching Scheme: TH: 2 Hours/week	Credit 01	Examination Scheme: In Sem. Continuous Evaluation: 30M End Sem. Exam : 20M
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Course Prerequisites:

Basic Engineering Mechanics, Mechanical Properties of Materials, Safety Awareness

Course Objective:

To Study the physical and mechanical properties of different material.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Identify physical and mechanical properties of bricks and tiles

CO2: Compare different metals on the basis of their properties.

CO3: Evaluate properties of timber and plywood.

CO4: Analyze structural element by using ICT tools.

Lab Contents

Guidelines for Assessment

Continuous assessment of laboratory work is to be done based on overall performance and lab practical's /assignments performance of student. Each lab practical/assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Lab assignment assessment include- timely completion, performance, innovation, efficient codes, Punctuality and neatness.

List of Laboratory Assignments/Experiments (minimum 10 to be covered)

Group A	Bricks and Tiles (Any Three)
1	Field test, Water absorption and efflorescence test on bricks.
2	Compression strength test on bricks.
3	Abrasion test of flooring tiles.
4	Flexural strength of flooring tiles.
Group B	Metals (Any Five)
5	Tension test on Mild Steel, Aluminum, copper and TMT steel.
6	Shear (Single and Double) test on mild steel.
7	Torsion Test on mild steel.
8	Impact (I and C) test on mild steel, aluminum and brass.

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9	Compression test on Mild Steel/ HYSD bar.
10	Bend and Re-bend test on Mild Steel and TMT steel.
Group C	Timber and Plywood
11	Compression test on timber (Parallel and Perpendicular to grain)
12	Bending Test on timber and plywood.
Group D	Analysis of simple structural elements by using programming languages.

IS Codes: IS 1608:2005, ISO 6892:1966, IS 432:1966, IS 5242:1969, IS 1717:1985, IS 1757:1973, IS1708:1980, IS 883:1994, IS 1237:1980, IS 654:1972, IS1077(1992)



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S. Y. B. Tech
Academic Year – 2023-2024 Semester -III
[CE2202T]: Building Materials and Construction

Teaching Scheme: TH: 3 Hours/week	Credit 3	Examination Scheme: In Sem. Evaluation : 20M Mid Sem. Exam : 30M End Sem. Exam : 50M
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Course Prerequisites: Building components, Green Building, Sustainable Building Concepts

Course Objective:

To make aware about various components of building and their function. The aim is to introduce materials and activities of construction from foundation to finishing of building and also describe importance of the building services, circulation and safety aspects.

Course Outcome:

After successful completion of the course, students will able to:

- CO1:** Explain details of building components, masonry and protective coating with respect to its functional requirement.
- CO2:** Identify suitability of form work, underpinning and scaffolding.
- CO3:** Describe various types of casting methods of concrete, its curing and prefabrication.
- CO4:** Choose suitable types of roofing and flooring materials according to functional requirement of building.
- CO5:** Plan building services and vertical circulation.
- CO6:** Describe safety aspects to be adopted at construction site.

Course Contents

UNIT-I	Building Construction and Masonry	06 Hours
Building components and their basic requirements i.e. substructure and Superstructure requirements. Introduction to automation in construction, Masonry– Introduction of stone masonry and brick masonry, characteristics of good building bricks, IS specification and tests, classification of bricks, types of bonds: English, Flemish, Header, Stretcher, construction procedure. Recent trends in light weight construction Protective Cladding.		
UNIT-II	Partition Wall, Form work, Underpinning and Scaffoldings	06 Hours
Types of partition wall (metal, wooden, Gypsum) Slip form work: Component parts- design criteria. Mivan shuttering, Underpinning. Scaffolding: Purpose, types. Nano Materials and Technologies- Carbon nanotubes, silicon Dioxide nanoparticles, Titanium Dioxide nanoparticles		

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UNIT-III	Casting Procedure of Concrete and Curing Methods	06 Hours
Form Work and Casting procedure for reinforced concrete columns, beams and slabs. Methods of Curing (Chemical Curing using Admixtures), Precast and pre-stressed concrete work, Standardization and Prefabrication to reduce cost. Construction Joints in concrete work.		
UNIT-IV	Building Components and Materials	06 Hours
Types of flooring and its functional requirement, floor materials and finishes. Factory floor tremix, laser flooring. Types of roof and its functional requirement. Roofing materials. Doors, Windows, Arches and Lintels Types of Doors, Windows, Arches and Lintels-Definition, installation, specifications. Fixtures and fastenings. Ventilators: Purpose and types.		
UNIT-V	Building Services and Vertical Circulation	06 Hours
Building services- plumbing services, lighting, ventilation, noise and acoustics, communications, smart and intelligent services. Vertical Circulations: design consideration, Types of staircase, and details of ramps, Steps, Ladders, lifts, and escalator. Fire escape staircase, Planing of Doglegged staircase.		
UNIT-VI	Safety on Construction Sites	06 Hours
Safety on sites, storage of materials, construction safety, fire proof construction. Planning considerations for Disaster Management. Introduction to “Building and Other Construction Workers” Act		

Text Books:

- T1 B. C. Punmia, Building construction, Laxmi Publications.
T2 S.V. Deodhar , Building Materials, Khanna Publication.
T3 Bindra and Arora, Building Construction, Dhanpat Rai Publications
T4 S.K. Duggal, Building Materials, New Age International Publishers.
T5 S. C. Rangwala, Building Construction, Charotdar Publications.

Reference Books:

- R1 Building Services Engineering by David V. Chadderton, (sixth edition or latest edition), London and New York.
R2 Civil Engineering Materials by Neil Jackson and Ravindra K. Dhir, Palgrave Macmillan.
R3 National Building Code -2016 (Latest)
R4 Building Design and construction by Frederick Merrit, Tata McGraw Hill.
R5 Times Saver Standards of Architectural Design Data by Callender, Tata McGraw Hill.
R6 Development plan and DCP Rules of urban local body, Volume 12, New Delhi.
R7 Model Building bye laws by MoUD, GoI.
R8 Civil Engineering Materials by TTTI Chandigarh, Tata McGraw Hill Publications
R9 Materials of construction by D.N. Ghose, Tata McGraw Hill.
R10 The construction of buildings, Seventh edition, Vol. I and Vol. 2 by R. Barry, Oxford: Blackwell science
R11 Building Materials Technology by Ruth T. Brantley and L. Reed Brantley, Tata McGraw Hill.
R12 Properties of Concrete by A.M. Neville, Pearson Education Limited.
R13 Mitchell’s Advanced Building Construction: The Superstructure by J. Sroud Foster

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S. Y. B. Tech
Academic Year – 2023-2024 Semester -III
[CE2203T]: Geotechnical Engineering

Teaching Scheme: TH: - 3 Hours/Week	Credit: 03	Examination Scheme: Theory In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks
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Course Prerequisites: Fundamentals of Chemistry, Mathematics and Physics

Course Objective:

To provide the basic principles of soil mechanics, Classification systems, Compaction, Permeability, Consolidation and Shear strength characteristics, to understand the engineering behavior of soil to address practical problems in Geotechnical Engineering.

To understand methods of soil exploration and carry out detailed geotechnical investigation in the field.
 To apply basic concepts of geotechnical engineering for evaluating bearing capacity of soils.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Explain the formation and structure of soil as a three-phase system.

CO2: Determine the index properties of soils.

CO3: Apply the principles of compaction, permeability, and consolidation.

CO4: Analyze total stress, pore pressure, and effective stress in soils.

CO5: Compute stress distribution in soils.

CO6: Analyze active and passive earth pressures and estimate the bearing capacity.

Course Contents

UNIT-I	Fundamentals of Soil	06 Hours
a) Introduction of soil; Soil as three phase system; Soil structure b) Introduction: Formation of soils, Phase Diagram, Classification of soil, Need of soil classification. Requirement for a soil classification system.		
UNIT-II	Soil Classification and Index Properties	06 Hours
Index properties of soil and Relationships between them. Study of Engineering properties of soil (LL, PL, SL). Particle size classification; IS classification system; Relative density, Stoke's law, Activity number		
UNIT-III	Engineering Properties	06 Hours
Compaction, Permeability and Consolidation		
UNIT-IV	Effective Stress and Seepage Analysis	06 Hours
Total stress, Pore pressure, Effective stress; Seepage pressure; Flow net		

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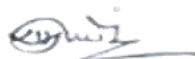
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UNIT-V	Stress due to Load and Shear strength	06 Hours
Stress Distribution in Soils – Geostatic stress, Shear Strength of Soils		
UNIT-VI	Earth Pressure and Bearing Capacity	06 Hours
Active and Passive earth pressure; Bearing Capacity of Shallow Foundations		
Text Books: T1. Braja M. Das (2018), “Principles of Geotechnical Engineering”, 7th Edition, Cengage Learning. T2. Punmia B.C., Jain A.K., and Jain A.K. (2019), ‘Soil Mechanics and Foundation Engineering.’, 17th Edition, Laxmi Publications Co., New Delhi. T3. Gopal Ranjan and Rao A.S.R. (2000), “Basic and Applied Soil Mechanics”, New Age International (P) Ltd., New Delhi. T4. Dr. K R Arora “Soil Mechanics and Foundation Engg.”, Standard Publishers.		
Reference Books: R1. Lambe T.W., “Soil Testing for Engineers”, Wiley Eastern Ltd., New Delhi R2. C Venkatramaiah, “Geotechnical Engineering”, New Age International Publishers. R3. Craig R.F. (2004), “Soil Mechanics”, 7th edition, Spon press, New York. R4. Bowles J.E. (1988), “Engineering Properties of Soil and Their Measurements”, McGraw Hill Book Co. New York.		



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S.Y. B. Tech
Academic Year – 2023-2024 Semester -III
[CE2203L]: Geotechnical Engineering Lab

Teaching Scheme: LAB: -2 Hours/Week	Credit: 01	Lab Evaluation In Sem Continuous Evaluation: 30 Marks: End Sem. Exam : 20 Marks
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Course Prerequisites : Fundamentals of Chemistry, Mathematics, Physics.

Course Objective:

To provide the basic principles of soil mechanics, Classification systems, Compaction, Permeability, Consolidation and Shear strength characteristics, to understand the engineering behavior of soil to address practical problems in Geotechnical Engineering. To understand methods of soil exploration and carry out detailed geotechnical investigation in the field.

To apply basic concepts of geotechnical engineering for evaluating bearing capacity of soils.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Classify the type of soils.

CO2: Determine Index Properties of soils

CO3: Determine in-situ density of soil.

CO4: Estimate the coefficient of Permeability of soil.

CO5: Determine shear parameter of soil.

CO6: Infer the soil investigation report.

Lab Contents

List of Laboratory Assignments/Experiment

1	Specific gravity determination by Pycnometer/ density bottle.
2	Sieve analysis and soil classification as per I.S. Codes, a) Mechanical Analysis using Sieve shaker. Study of Hydrometer Analysis
3	Determination of Consistency limits and their use in soil classification as per I.S. Codes.
4	In situ density/ Field Density test by a) Core cutter Sand Replacement
5	Determination of Compaction Characteristics by a) Standard Proctor Modified Proctor test
6	Determination of coefficient of permeability by a) Constant head method Variable head method.
7	Shear strength tests on soil a) Direct shear test.

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	Unconfined compression test.c)Triaxial Shear test.
8	Study and Present soil investigation report.
IS codes: 1.IS 2720-Part 3 2. IS 2720-Part 4(1985) 3. IS 2720-Part 5(1985) 4. IS 2720-Part XXIX-(1975) 5. IS 2720-Part VII-(1980), IS 2720-Part VIII (1983) 6. IS 2720-Part 17 7. IS 2720-Part -13(1986)	



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S.Y. B. Tech
Academic Year – 2023-2024 Semester -III
[CE2204T]: Fluid Mechanics

Teaching Scheme: TH: - 3 Hours/Week	Credit 3	Examination Scheme: In Sem. Evaluation :20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks
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Course Prerequisites:

Engineering Mechanics, Engineering Mathematics and Engineering Physics

Course Objective:

To study the fluid properties along with concept of dimensional analysis. Make equipped with principles of continuity, momentum and energy equation applicable to flowing fluid for the civil engineering problems.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Describe fluid properties, dimensional analysis and model Studies

CO2: Analyze fluid at rest and fluid in motion without force consideration

CO3: Analyze fluid in motion and its application.

CO4: Distinguish laminar, turbulent flow for pipe flow

CO5: Apply open channel flow principles to uniform flow and depth discharge relationship.

CO6: Compute GVF and analyze flow around object.

Course Contents

UNIT-I	Properties of Fluid and Dimensional Analysis	06 Hours
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, vapour pressure, p r o b l e m s involving use of above fluid properties. Dimensions of physical quantities, dimensional homogeneity, dimensional analysis using Buckingham's π theorem method, geometric kinematic and dynamic similarity, dimensionless parameters. (Reynolds No., Froude No., Euler No., Mach no. and Weber No) and their significance.		
UNIT-II	Fluid Statics and kinematics	06 Hours
Fluid Statics -The basic equation of hydrostatics, 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 and precision manometers, pressure transducers and their types). Centre of pressure, total pressure on plane and curved surfaces, practical applications. Introduction to IS code 3624-1987 (Pressure gauge and vacuum gauge) Fluid		

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kinematics-Methods of describing the motion of fluid, velocity and acceleration, stream line, stream tube, path line, and streak line, control volume. equation of continuity for one-dimensional flow along a streamline, types of motion, rotational and irrotational motion, velocity potential, stream function and flow net

UNIT-III

Fluid Dynamics

06 Hours

Forces acting on 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). Discharge measurement by Venturi meter, Orifice and orifice meter, Rotameter, Flow through sharp edged circular orifice discharging free, Hydraulic coefficients for orifice, Pitot tube

UNIT-IV

Laminar and Turbulent Flow and flow through Pipe

06 Hours

A) Characteristics of laminar flow, laminar flow through a circular pipe: Hagen Poiseuille equation, Characteristics of turbulent flow, instantaneous velocity, temporal mean velocity, scale of turbulence and intensity of turbulence, Prandtl's mixing length theory, resistance to flow in smooth and rough pipes, friction factor for commercial pipes, Moody's diagram.
B) Flow through pipes: Energy losses in pipe flow, Equation for major loss and minor losses in pipe, flow through pipes in simple and compound pipe, pipes in series, parallel, Dupit's equation, Introduction to siphon.

UNIT-V

Open channel flow

06 Hours

Introduction to Open channel flow: Classification of channels, channel flows and geometric elements of channel, Basic governing equations of Channel flow viz. continuity equation, energy equation and momentum equation, Velocity distribution in open channel flow. Uniform flow in open channels: Uniform flow formulae: Chezy's and Manning's formulae; Important terms pertaining to uniform flow, viz. normal depth, conveyance, section factor, Uniform flow computations. Most efficient channel sections: rectangular, triangular and trapezoidal. Depth-Energy Relationships in Open Channel Flow: Specific energy and Specific force diagram, Depth discharge Diagram, Critical depth, Conditions for occurrence of critical flow; Froude's number, flow classification based on it.

UNIT-VI

Gradually Varied Flow

06 Hours

Gradually Varied Flow (GVF) in Open Channel Flow: Theory and Computation Basic Assumptions of GVF; Dynamic equation of GVF - Alternative forms; Classification of channel bed slopes, Various GVF profiles, Methods of GVF computations: Direct Step method. (mention of other method), Fluid Flow around Submerged Objects: Practical problems involving fluid flow around submerged objects, Definitions and expressions for drag, lift, drag coefficient, lift coefficient, types of drag. Introduction to Drag on sphere, cylinder.

Text Books:

- T1. Hydraulics and Fluid Mechanics by Dr. P. N. Modi and Dr. S. M. Seth, Standard Book House.
- T2. Flow in Open Channels by K Subramanya, Pub: Tata McGraw Hill, New Delhi
- T3. Fluid Mechanics and Fluid Machinery by R. K. Bansal, Laxmi Publications.

Reference Books:

- R1. Fluid Mechanics and Hydraulic Machines by McGraw Hill Education (India).
- R2. Fluid Mechanics by YunusCengel, JhonCimbala, Tata MacgrawHill, New Delhi.

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- R3. Fluid Mechanics by R. J. Garde, A.J Mirajgaonkar, SCITECH Publication.
R4. Fluid Mechanics by Streeter and Wylie, Tata McGraw Hill.
R5. Fluid Mechanics by K. Subramanya, McGraw Hill.
R6. Fluid Mechanics by Frank White, McGraw Hill.
R7. Open Channel Hydraulics by Ven Tee Chow, Pub: McGraw- Hill Book Company- Koga
IS Code: IS code 3624-1987 (Pressure gauge and vacuum gauge)

Hand books:

<http://www.engmatl.com/home/viewdownload/10-engineering-handbooks-pocket-books/123-fluid-mechanics-handbook>

<http://www.springer.com/materials/mechanics/book/978-3-540-25141-5>.

Resources:

<http://nptel.iitm.ac.in/courses.php>

http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/FLUIDMECHANICS/ui/Course_home-3.htm



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S.Y. B. Tech
Academic Year – 2023-2024 Semester -III
[CE2204L]: Fluid Mechanics Lab

Teaching Scheme: LAB: -2 Hours/Week	Credit: 01	Lab Evaluation In Sem Continuous Evaluation: 30 Marks: End Sem. Exam : 20 Marks
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Course Prerequisites: Engineering Mechanics, and Engineering Physics

Laboratory Objective:

To perform experiments related fluid properties, kinematics and dynamics flow related to pipe flow. Besides, another objective is to perform experiments related to open channel flow

Laboratory Outcome:

After successful completion of lab, students will able to:

CO1: Determine fluid properties

CO2: Verify Bernoulli's theorem and its application

CO3: Determine major loss in pipe flow

CO4: Determine Fluid properties in open channel flow

CO5: Application of soft technique related to fluid problems

List of Laboratory Assignments/Experiments (minimum 8 to be covered)

Experiments. First six experiments are compulsory.

1	Measurement of viscosity by Redwood viscometer.
2	Experimental verification of Bernoulli's theorem with reference to loss of energy
3	Calibration of Venturi meter / Orifice meter.
4	Plotting the pattern of laminar flow using Reynolds apparatus or Halshaw's apparatus.
5	Determination of, minor loss in a pipe system/friction factor for a given pipe.
6	Flow around a Circular Cylinder/Aerofoil.
7	Study of Uniform Flow Formulae for Open channel.
8	Velocity Distribution in Open Channel Flow.
9	Calibration of Rectangular and Triangular Notch

Assignments any two of following

1	Solve three reservoir problem / pipe network analysis using WATER GEMS
2	Determination of friction factor for a pipe using any programming language (PYTHON)
3	Application of any fluid mechanics software to analyze the problem.
4	Developing a demo model related to any fluid flow phenomenon (physical model/ soft model).
5	Assignment on drawing of flow net graphically
6	Site visit : Report on Site visit to any one of the Research Institute like CWPRS, WALMI, MERI etc

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Text Books:

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T2 Flow in Open Channels by K Subramanya, Pub: Tata McGraw Hill, New Delhi
T3 Fluid Mechanics and Fluid Machinery by R. K. Bansal, Laxmi Publications.

Reference Books:

- R1.Fluid Mechanics and Hydraulic Machines by McGraw Hill Education (India).
R2.Fluid Mechanics by YunusCengel, JhonCimbala, Tata MacgrawHill, New Delhi.
R3.Fluid Mechanics by R. J. Garde, A.J Mirajgaonkar, SCITECH Publication.
R4.Fluid Mechanics by Streeter and Wylie, Tata McGraw Hill.
R5.Fluid Mechanics by K. Subramanya, McGraw Hill.
R6.Fluid Mechanics by Frank White, McGraw Hill.
R7.Open Channel Hydraulics by Ven Tee Chow, Pub: Mcgraw- Hill Book Company- Koga

IS Code:

- IS code 3624-1987 (Pressure gauge and vacuume gauge)

Hand books:

- <http://www.engmatl.com/home/viewdownload/10-engineering-handbooks-pocket-books/123-fluid-mechanics-handbook>
- <http://www.springer.com/materials/mechanics/book/978-3-540-25141-5>.

e-Resourses:

- <http://nptel.iitm.ac.in/courses.php>

<http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/FLUIDMECHANICS>
Course_home-3.htm

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S.Y. B. Tech
Academic Year – 2023-2024 Semester -III
[HS2203T]: Universal Human Values and Ethics

Teaching Scheme TH: 2	Credit 2	Examination Scheme: In Sem. Evaluation : 20Marks Mid Sem. Exam : 30marks End Sem. Exam : 50marks
Course Objectives: - To help students to distinguish between values and skills and understand the need, basic guidelines, content and process of value education. - To help students to initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession - To help students to understand the meaning of happiness and prosperity for a human being. - To facilitate the students to understand harmony at all the levels of human living, and live accordingly.		
Course Outcome: After successful completion of the course, students will able to CO1: Relate foundational concepts of value education, self-exploration, happiness, prosperity, and the basic human aspirations. CO2: Develop an understanding of human beings as a co-existence of self and body. CO3: Evaluate the values in human relationships and their impact on societal harmony and nature.		
Course Contents		
UNIT-I	Introduction to value education	06 Hours
Understanding value education, self-exploration as the process for value education, happiness and prosperity, right understanding, relationship and physical facility, happiness and prosperity—current scenario, method to fulfill the basic human aspiration.		
UNIT-II	Harmony in human being	06 Hours
Understanding human being as a coexistence of the self and body, understanding the needs of self and body, the body as an instrument of the self, understanding activities of self, understanding harmony in the self, understanding the harmony in self with body, programs to fulfill the self-regulation and health.		
UNIT-III	Harmony in family and society	06 Hours
Harmony in family—a basic unit of human interaction, Human—human relationship, values in relationships, understanding harmony in the society and vision for universal human order.		

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UNIT-IV	Harmony in nature	06 Hours
Understanding the harmony in society and nature, understanding the four orders of nature, realizing existence as co-existence at all levels.		
Guidelines for Assessment		
In semester evaluation shall be based on continuous assessment based on timely submission of assignments.		
Text Books: T1. Human values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010 T2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.		
Reference Books: R1. Manav Vyavhar Darshan , A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 2001		



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S.Y. B. Tech
Academic Year – 2023-2024 Semester -III
[ES2201T]: Engineering Mathematics III

Teaching Scheme: TH: - 3 Hours/Week	Credit 3	Examination Scheme: In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks
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Pre requisites: - Differential and Integral Calculus, Differential equations of first order and first degree, Fourier series and Vector algebra.

Course Objectives:

To familiarize the students with concepts and techniques in Ordinary and Partial differential equations, Laplace transform, Numerical Methods, Statistics, Probability and Vector Calculus. The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their disciplines.

Course Outcomes:

At the end of this course, students will be able to

CO1: Solve higher order linear differential equations and its applications to modelling and analysing civil engineering problems such as bending of beams, whirling of shafts and mass spring systems.

CO2: Apply Laplace transform techniques to solve differential equations involved in vibration theory, heat transfer and related civil engineering applications

CO3: Solve the system of linear equations using direct and iterative numerical techniques and develop solutions for ordinary differential equations using single step and multistep methods applied to hydraulics, geotechnics and structural systems.

CO4: Apply statistical methods like correlation, regression and probability theory in data analysis and predictions in civil engineering.

CO5: Evaluate the important concepts associated with scalar fields and vector fields such as the gradient, directional derivative, the divergence, curl and evaluate line, surface and volume integrals as applicable to fluid flow problems.

CO6: Solve Partial differential equations (PDEs) such as wave equation, one and two dimensional heat flow equations related to civil engineering applications.

Course Contents

UNIT-I	Linear Differential Equations (LDE) and Applications	07 Hours
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LDE of n^{th} order with constant coefficients, Complementary Function, Particular Integral, General method, Short methods, Method of variation of parameters, Cauchy's and Legendre's DE, Simultaneous and Symmetric simultaneous DE. Modelling of problems on bending of beams, whirling of shafts and mass spring systems

UNIT-II	Laplace Transform (LT)	07 Hours
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Definition of LT and Inverse LT, Properties and Theorems, LT of some special functions viz. Periodic, Unit Step and Unit Impulse. Applications of LT for solving LDE.

UNIT-III	Numerical Methods	06 Hours
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Numerical solutions of system of linear equations: Gauss elimination method, Jacobi method and Gauss-Seidel method. Numerical solutions of ordinary differential equations: Euler's method, Modified Euler's method, Runge-Kutta 4th order method and Predictor-Corrector methods.

UNIT-IV	Statistics and Probability	07 Hours
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Measures of central tendency, Standard deviation, Coefficient of variation, Moments, Skewness and Kurtosis, Correlation and Regression, Reliability of Regression estimates.

Probability, Theorems of Probability, Probability density function, Probability distributions: Binomial, Poisson, Normal, Test of Hypothesis: Chi-square test and t-test

UNIT-V	Vector Calculus	07 Hours
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Vector differentiation, Gradient, Divergence and Curl, Directional derivative, Solenoidal and Irrotational fields, Vector identities. Line, Surface and Volume integrals, Green's Lemma, Gauss's Divergence theorem and Stoke's theorem

UNIT-VI	Applications of Partial Differential Equations (PDE)	07 Hours
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Basic concepts, Modelling of vibrating string, Wave equation, one and two dimensional Heat flow equations, method of separation of variables, Fourier series. Applications of PDE to problems of civil engineering

Guidelines for Tutorial and Term Work:

Tutorial shall be engaged in batches (batch size of 22 students maximum) per division.

Term work shall be based on continuous assessment of six assignments (one per each unit).

Text Books:

T1. Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill).

T2. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi).

Reference Books:

R1. Advanced Engineering Mathematics, 10e, by Erwin Kreyszig (Wiley India).

R2. Differential Equations, 3e by S. L. Ross (Wiley India).

R3. Numerical Methods for Scientific and Engineering Computation, by M. K. Jain, S. R. K. Iyengar and R. K. Jain, 5e, (New Age International Publication)

R4. Numerical Methods for Engineers, 7e by S.C. Chapra and R. P. Canale (McGraw-Hill Education)

R5. Introduction to Probability and Statistics for Engineers and Scientists, 5e, by Sheldon M. Ross (Elsevier Academic Press).

R6. Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Cengage Learning).

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S .Y. B. Tech

Academic Year – 2023-2024 Semester -III

[CE2205T]: Innovation and Entrepreneurship

Teaching Scheme: TH: - 2 Hours/Week	Credit 2	Examination Scheme: In Sem. Evaluation: 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks
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Course Objectives:

- To understand an entrepreneur through case studies of successful entrepreneurs.
- To select the appropriate Product or Service for a business and Innovate in Global Thrust Areas.
- To understand the pain areas of an entrepreneur and study site selection, market survey, production, Finance, Costing and applied management in Business.
- To understand Business Model Canvas and prepare Project Report for the selected business.

Course Outcome:

After successful completion of the course, students will able to:

- CO1:** Identify product or service for the business.
- CO2:** Discuss Innovative Ideas in Global Thrust Areas like Agriculture and food processing, Automation, Environment, Health care, Energy, AI and ML.
- CO3:** Plan a micro or small enterprise by conducting market surveys and performing financial assessments such as ROI, payback period, and break-even analysis.
- CO4:** Develop a business model canvas.

Course Contents

UNIT-I	To understand Entrepreneur	6 Hours
Who is an Entrepreneur? Case Studies of Successful Entrepreneurs. Business Opportunity Identification. Case study of any two products or services.		
UNIT-II	Innovation	6 Hours
What is Innovation? Innovation Principles to Ideate. Idea Generation in global Thrust areas.		
UNIT-III	Procedure for Investment	6 Hours
Planning a Micro, Small Enterprise. Whom to contact for what. Market Survey tools. Return on Investment, Payback Period, Break Even Analysis, Basics of Costing.		
UNIT-IV	Registration of Startup	6 Hours
Business Model Canvas. Startup potential in India. Udyam Registration on Ministry of MSME online. Startup India Registration on Startup India portal.		

Text Books:

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- T1. The Dynamics of Entrepreneurship Development and Management by Vasant Desai Himalaya Publishing House.
- T2. A Manual for Entrepreneurs by Dr. Dinesh Awasthi, Entrepreneurship Development Institute of India, Ahmedabad.
- T3. Introduction to Entrepreneurship by Dr Santosh Kumar Sahu, Bookscape Publication.

Reference Books:

- R1. Entrepreneurship 11th Edition by Robert Michael P., Peters Dean A., Shephers Sabyasachi Sinha, Publication MC Graw Hill India
- R2. Project Management and Entrepreneurship by Dr. Vasant Desai, Himalaya Publishing House.



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Academic Year – 2023-2024 Semester -IV
[CE2206T]: Concrete Technology

Teaching Scheme: TH: - 02/Week	Credit TH:2	Examination Scheme: In Sem. Evaluation :20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50Marks
Course Prerequisites: Basic civil engineering/ Basics of construction materials like lime, cement, natural and artificial sand, plain cement concrete. Chemistry / chemical reaction between cement and water		
Course Objective: The course is designed with the objective to make the students familiarize with physical and mechanical properties of various ingredients of concrete and help them to understand behavioral aspect of concrete in its fresh and hardened state. It helps the students to gain the knowledge of various topics such as deterioration, method of repairs. It also aims to impart the knowledge regarding concrete mix design.		
Course Outcome: After successful completion of the course, students will able to: CO1: Explain the properties, and significance of ingredient of concrete. CO2: Investigate the properties of fresh concrete. CO3: Investigate the properties of hardened concrete. CO4: Describe the special concrete types and concreting techniques. CO5: Design the concrete mix of desired grade by using various methods. CO6: Explain deteriorations, repairs, durability and Permeability of concrete.		
Course Contents		
UNIT-I	Introduction to Concrete as a Construction Material	04 Hours
Cement – a) classification of cement, types of cement, hydration of cement b) Aggregate and Admixtures – Different classifications of aggregate, mechanical and physical properties, deleterious materials, soundness, alkali-aggregate reaction Quality of water for use in concrete, role of admixture, classification and types of liquid admixtures and mineral admixtures classification and types of admixtures like accelerators, retarders, plasticizers, super plasticizers, mineral admixtures-fly ash, silica fume, ground granulated blast furnace slag.		

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UNIT-II	Properties, Production and testing of fresh concrete	04 Hours
Fresh concrete: Workability – factors affecting workability, cohesion and segregation, Bleeding, Laitance, manufacturing of concrete, maturity rule. Tests of fresh concrete – Various Workability test for regular and advanced concrete.		
UNIT-III	Properties and tests on hardened concrete	04 Hours
Hardened concrete – Strength of concrete, factors affecting strength, relation between tensile and compression strength, impact strength, of hardened concrete Nondestructive testing: Rebound hammer, Ultrasonic pulse velocity, Pullout test and Impact echo test, Rebar locator.		
UNIT-IV	Concreting techniques and Special Concretes	04 Hours
Special concreting techniques: pumping of concrete, under water concreting, ready mix concrete, and roller compacted concrete, cold weather concreting, hot weather concreting. Special concretes – Types Various special concrete and its need and functions		
UNIT-V	Concrete Mix Design	04 Hours
Concepts of Mix Design, Factors to be considered, methods of Mix Design for M25 and above grades by latest revised edition of IS-456, 10262.		
UNIT-VI	Deterioration and repairs.	04 Hours
Deterioration – Durability, factors affecting the durability of concrete, Permeability, chemical attack and sulphate attack by seawater, acid attack, chloride attack, carbonation of concrete and its determination, corrosion of reinforcement. Repairs – Symptoms and diagnosis of distress, evaluation of cracks, selection of repair procedure, repair of defects using various types and techniques – shotcrete and grouting.		
Text Books: T1. Concrete Technology by M. S. Shetty, S Chand, New Delhi-110055. T2. Concrete Technology by M. L. Gambhir, Tata McGraw-Hill. T3. Concrete technology by A. M. Neville, J.J. Brooks, Pearson.		
Reference Books: R1. Concrete Technology by A. R. Shanta Kumar, Oxford University Press, 2018. R2. Properties of Concrete by A. M. Neville, Longman Publishers. R3. Concrete Technology by R.S. Varshney, Oxford and IBH. R4. Microstructure and Properties of Concrete by P. Kumar Mehta, Prentice Hall. R5. Concrete Mix Design by A. P. Remideos, Himalaya Publishing House. R6 Concrete Structures, Repair, Rehabilitation and Retrofitting by J. Bhattacharjee, CBS Publishers and Distributors Pvt. Ltd. R7. Durability Design of Concrete Structures, by A. Sarja and E. Vesari, E and FN Spon Publication, 1996.		
IS Codes: Latest revised editions of IS codes: IS 456, IS 269, IS 1489, IS 4031, IS 383, IS 2386, IS 9103, IS 516, IS 1199, IS 10262, SP 23, IS 13311.		

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S .Y. B. Tech
Academic Year – 2023-2024 Semester -IV
[CE2206L]: Concrete Technology Lab

Teaching Scheme: LAB: -02 Hours/Week	Credit 01	Examination Scheme: ISCE: 30 Marks End Sem. Exam: 20Marks
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Course Objective:
To Study the physical and mechanical properties of different material.

Course Outcome:
After successful completion of the course, students will able to:
 CO1: Determine physical and mechanical properties of cement and aggregates.
 CO2: Design concrete mix proportions by IS Code method.
 CO3: Determine the compressive strength and workability of concrete.
 CO4: Analyze the stress-strain behavior of concrete under compressive loading using cylindrical specimens.
 CO5: Interpret the indirect tensile strength and flexural strength of hardened concrete.
 CO6: Prepare site visit report including rate analysis.

Lab Contents

Guidelines for Assessment

Continuous assessment of laboratory work is to be done based on overall performance and lab practical's /assignments performance of student. Each lab practical/assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Lab assignment assessment include- timely completion, performance, innovation, efficient codes, Punctuality and neatness.

**List of Laboratory Assignments/Experiments (Experiments 6,11 and12 numbers are compulsory.
 Minimum 10 experiments to be covered)**

1	Fineness of cement and fly ash (by sieve method)
2	Standard consistency, Initial and final setting time and soundness of cement.
3	Compressive strength of cement.
4	Fineness modulus, Moisture content, silt content, bulk density and specific gravity of coarse aggregate.
5	Fineness modulus, Moisture content, silt content, bulk density and specific gravity of fine

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	aggregate.
6	Concrete mix design by IS code method using excel sheet/software
7	Compressive strength test of concrete on cubes by destructive and non-destructive method rebound Hammer and Quality of concrete by ultra-sonic pulse velocity (demo Video).
8	Workability of concrete with and without admixture by slump cone, compaction factor, and or Vee-Bee Consistometer apparatus.
9	Compressive strength test of concrete on cylinder (Stress –strain behavior- demo Video).
10	Indirect tensile strength and flexural strength of hardened concrete.
11	Report on Site Visit (RMC Plant and advanced materials and techniques using on sites) and prepare sheet of comparison of RMC materials with regular concrete and its rates
12	Market survey of structural materials including its costing
IS Codes: Latest revised editions of IS codes: IS 456, IS 269, IS 1489, IS 4031, IS 383, IS 2386, IS 9103, IS 516, IS 1199, IS 10262, SP 23.IS 13311. IS 1608:2005, ISO 6892:1966, IS 432:1966, IS 5242:1969, IS 1717:1985, IS 1757:1973, IS1708:1980, IS 883:1994, IS 1237:1980, IS 654:1972, IS1077(1992)	

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TATHAWADE, PUNE-33
 (An Autonomous Institute Affiliated to SavitribaiPhule Pune University, Pune)



S .Y. B. Tech
Academic Year – 2023-2024 Semester -IV
[CE2207T]: Building Planning and Architecture

Teaching Scheme: TH: - 3 Hours/Week	Credit: 03	Examination Scheme: Theory In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks
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Course Prerequisites: Principles of planning, fundamentals of Graphics.

Course Objective: This course aims to enable students for developing the plan the, elevation and section of residential and public building by referring bye-laws and Architectural Aspects along with study of disaster management concepts.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Describes necessity of town planning and legal aspects.

CO2: Explain National Building Code for planning of building and safety on construction site.

CO3: Describe green building principles, sustainable materials, and climatic considerations in planning.

CO4: Discuss Architectural Principles and Building byelaws for building construction.

CO5: Draw line plan of public building.

CO6: Discuss about building services and disaster management concepts.

Course Contents

UNIT-I	Introduction to Planning	06 Hours
Introduction to Town Planning: Necessity and evolution of town planning in India. Development plan and its importance, Objectives and Contents of DP, Land use zoning, Introduction to different zones of land in town planning, Requirements of various zones. Legal Aspects: Government Bodies responsible for sanction plan and other related documents, 7/12 abstract, Form 6 and its types, Concept of TDR(Transferable Development Rights), Concept of TOD(Transit-oriented development) List of documents to be submitted to local authority, Procedure for Commencement and Occupancy Certificate, Various NOCs required, Ownership documents (Agreement for Sale, Sale Deed, Conveyance Deed, Lease in case of leasehold properties, Power of Attorney, Agreements Deed/Contracts), stamp duty rates /stamp duty.		
UNIT-II	Building Drawings	06 Hours
Building Bye-Laws		

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National Building Code-2016, Unified Development Control and Promotion Regulations Rules, Maharashtra Industrial Development Corporation (MIDC), Necessity of bye-laws, floor area ratio (F.A.R.), concept of V.P.R. Marginal distances, building line: control line, height regulations, room sizes, Area calculations (built-up area, carpet area etc.), Rules for ventilation and lighting. Principles of Architectural planning, Relation between form, function, utility, aesthetics. scales for various types of drawings, dimensioning, symbols and Abbreviations as per I.S. 962-1989 code

Building Drawings

Concept of Preliminary Drawings, Submission Drawing, Working Drawings, Developed plans, sections, elevations, site plan, Location Plan, Area Statements, Schedule of Opening-Doors, Windows, Ventilators, construction notes,

UNIT-III	Green Building and Rating System	06 Hours
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Green Building

Introduction to Green Building, Green Materials, Planning concepts (site selection, orientation, sun path and wind diagram etc.), Climatic considerations and Landscaping.

Green Building Rating System

Green building rating systems (IGBC, GRIHA LEED etc.) , GEM (Green Environment Management) certification

UNIT-IV	Planning of Residential Buildings	06 Hours
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Planning of Residential Buildings:

Planning and design for Preliminary Drawings, Submission drawings, Working Drawings for residential buildings-Bungalows, Row houses, Twin bungalows, Ownership Flats, Apartments, etc.

UNIT-V	Planning of public and Industrial buildings	06 Hours
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Planning of Public and Industrial buildings:

Functional requirements and planning of various types of public buildings (Line Plan only) – Business building, Mercantile building, Industrial buildings, Commercial buildings, Educational buildings, Institutional buildings, Assembly buildings, Storage Building, Hazardous buildings, High rise building, Vegetable Markets etc.

UNIT-VI	Building Services and Disaster Management	06 Hours
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Building Services-Design of water supply, waste water and storm water collection system for various types of buildings. Wet and dry solid waste segregation, vermicomposting, vertical circulation,

Disaster Management on Construction site - Disaster Management Cycle, Safety on sites, Evacuation Time, Fire Escape Elements, Need for Flood Protection and Earthquake Resistant Structures

Text Books:

T1 .M. G. Shah, C.M. Kale and S. Y. Patki, Building drawings with an integrated Approach to Built-Environment, Tata McGraw Hill, New Delhi (5th Edition or Latest edition)

T2 .Dr. S.V.Deodhar , Building Science and planning, Khanna Publishers.

T3 .David V. Chadderton , Building Services Engineering (sixth edition or latest edition), London and New York.

T4 .Jan A. Van Der Westhuizen, Drawing for Civil Engineering.

Reference Books:

R1.National Building Code -2016 (Latest)

R2.Building Design and construction by Frederick Merrit, Tata McGraw Hill.

R3.Times Saver Standards of Architectural Design Data by Callender, Tata McGraw Hill.

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- R4.**I.S. 962-1989 Code for practice for Architectural and Building Drawings.
R5.Development plan and DCP Rules of urban local body, Volume 12, New Delhi.
R6.Model Building bye laws by MoUD, GoI.
R7.Green and Sustainable Building Manuals by IGBC-Hyderabad and TERI-GRIHA, New Delhi.
R8.Building Materials by S.K. Duggal, New Age International Publishers.
R9.Civil Engineering Materials by TTTI Chandigarh, Tata McGraw Hill Publications



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[CE2207L]: Building Planning and Architecture Lab

Teaching Scheme: LAB: -2 Hours/Week	Credit: 01	Lab Evaluation In Sem Continuous Evaluation: 30 Marks: End Sem. Exam : 20 Marks
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Course Prerequisites: Principles of planning, fundamentals of Graphics.

Course Objective: This course aims to enable students for developing the plan the, elevation and section of residential and public building by referring bye-laws and Architectural Aspects along with study of disaster management concepts.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Develop architectural line plan for residential or public buildings by considering principles of planning.

CO2: Draw Perspective drawing of building element.

CO3: Identify requirements of documents for sanctioning plan.

Lab Contents

Guidelines for Assessment

Innovative Concept, Line work, Planning/designing abilities, Presentations and understanding based on oral examination of relevant exercises.

List of Laboratory Assignments/Experiments (Minimum 03 to be covered)

1	Prepare a report file (It shall consist of data/information of the project, planning Considerations and line plans, Design calculations).
2	Detailed Drawing of Residential or Public building on A1 paper with suitable scale. Floor Plan, Elevation ,Sectional Elevation, Site plan indicating water supply and drainage line, , Foundation Plan, Location Plan, Structural Drawings, with area statement construction notes, schedule of openings
3	Working drawings of any type of Residential or Public building drafted using software (Bentley-Micro Station, Auto-CAD, CADD, RIVET, Google Sketch etc.) suitable scale or preferably 1:50.
4	Perspective drawing of a small building element from the same project/ single storeyed building.
5	Assignment on preparing entire set of documents required for sanctioning plan from PMC, PCMC, MIDC, MMRDA etc.

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Text Books:

- T1** .M. G. Shah, C.M. Kale and S. Y. Patki, Building drawings with an integrated Approach to Built-Environment, Tata McGraw Hill, New Delhi (5th Edition or Latest edition)
T2 .Dr. S.V.Deodhar , Building Science and planning, Khanna Publishers.
T3 .David V. Chadderton , Building Services Engineering (sixth edition or latest edition), London and New York.
T4 .Jan A. Van Der Westhuizen , Drawing for Civil Engineering.

Reference Books:

- R1**.National Building Code -2016 (Latest)
R2.Building Design and construction by Frederick Merrit, Tata McGraw Hill.
R3.Times Saver Standards of Architectural Design Data by Callender, Tata McGraw Hill.
R4.I.S. 962-1989 Code for practice for Architectural and Building Drawings.
R5.Development plan and DCP Rules of urban local body, Volume 12, New Delhi.
R6.Model Building bye laws by MoUD, GoI.
R7.Green and Sustainable Building Manuals by IGBC-Hyderabad and TERI-GRIHA, New Delhi.



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Academic Year – 2023-2024 Semester -IV
[CE2208T] Analysis of Structures

Teaching Scheme: TH: 3 Hours/Week	Credit 3	Examination Scheme: In Sem. Evaluation: 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks
Course Prerequisites: Equilibrium Condition, Bending moment and Shear force diagram, Moment of inertia.		
Course Objective: To calculate various unknown forces in determinate and indeterminate structures.		
Course Outcome: After successful completion of the course, students will able to: CO1: Analyze indeterminate structures using slope deflection method. CO2: Analyze indeterminate structures using moment distribution method. CO3: Apply influence line diagram for beams and trusses. CO4: Estimate unknown forces for Arches and Tension Cables. CO5: Analyze indeterminate structures and trusses using Flexibility and unit load method. CO6: Analyze indeterminate structures and frames using stiffness method.		
Course Contents		
UNIT-I	Slope-deflection method of analysis	6 Hours
Slope-deflection equations, equilibrium equation of Slope deflection method, application to beams with and without joint translation and rotation, yielding of support, application to sway and non-sway rigid jointed rectangular portal frames.		
UNIT-II	Moment Distribution Method of Analysis	6 Hours
Moment distribution method of analysis: Stiffness factor, carry over factor, distribution factor, application to beams with and without joint translation and yielding of support, application of moment distribution method to sway and non sway rigid jointed rectangular portal frames.		
UNIT-III	Influence Line Diagram of Beams and Trusses	6 Hours
Influence line diagrams for reactions, shear force and bending moment for determinate beams. Influence line diagrams for reactions, shear force and bending moment for indeterminate beams Influence line diagram for trusses.		
UNIT-IV	Analysis of Arches and Cables	6 Hours

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Types of arches, analysis of three hinged parabolic arch with supports at same level, and different levels, analysis of two hinged parabolic and semicircular arch with supports at same level, analysis of three hinged semicircular arch with supports at same level, determination of radial shear and normal thrust for parabolic and circular two hinged and three hinged arch. Analysis of parabolic and semicircular two hinged arches for temperature effect and rib shorting. Tension in the cable supported at same and different levels, parabolic cables subjected to UDL.

UNIT-V	Flexibility Method of Matrix Analysis and Unit Load Method	6 Hours
Flexibility Method: Fundamental concepts of flexibility method of analysis, formulation of flexibility matrix, application of flexibility method to pin jointed plane trusses, beams and rigid jointed rectangular portal frames. Analysis of redundant trusses by unit load method, lack of fit, temperature changes.		
UNIT-VI	Stiffness Method of Matrix Analysis	6 Hours
Stiffness method: Fundamental concepts of stiffness method of analysis, formulation of stiffness matrix, application of stiffness method to beams and rigid jointed rectangular portal frames		

Text Books:

- T1 S. Ramamrutham, S. Narayan “ Theory of structures” , Dhanapat Rai Publications.
T2 S S. Bhavikatti , Structural Analysis Vol-1, third edition, Vikas publishing House, PVT, LTD.
T3 Analysis Of Structure By Dr. M.M. Ratwani and S K Duggal (VOL. I and II)

Reference Books:

- R1. B C Punmia, Jain, “ Mechanics of Materials: Vol I and II”, Laxmi Publications.
R2. R.C. Hibbeler, “Structural Analysis”, Pearson Education Asia Pub. (5th Edition).
R3. L. S. Negi and R. S. Jangjid, Structural Analysis, Tata Mc. Graw, New Delhi, 1997.
R4. Junnarkar S. B., Mechanics of Structure, Volume I and II
R5. G.S. Pandit and S. P. Gupta, Structural Analysis: A matrix approach, Tata McGraw Hill.



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Academic Year – 2023-2024 Semester -IV
[CE2209T] Surveying and Geomatics

Teaching Scheme: TH: 03 Hours/Week	Credit 3	Examination Scheme: In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks
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Course Prerequisites :Basic Geometry and Physics

Course Objective:

To understand the different kinds of mapping and their relative accuracy along with the different methods of leveling and their accuracy. To use of concepts of geometry in getting solutions to the obstacles in surveying and to set out curves for highways and railways.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Calculate the directions of lines and elevations of objects.

CO2: Apply theodolite observations for mapping.

CO3: Apply advance methods of surveying for accurate data collection and mapping.

CO4: Determine data to Set out of curves for highways and railways.

CO5: Describe the process of establishing control points for large area mapping

CO6: Discuss regarding layouts of construction and hydrographic survey.

Course Contents

UNIT-I	Compass and Levelling	6 Hours
Definition, objective and fundamental classification of surveying (Plane and Geodetic), Concept of bearing, meridian and their types, construction and use of prismatic compass, local attraction and correction for local attraction, dip, declination and calculation of true bearings. Plane tabling, Planimeter. Introduction to leveling, Types of leveling, Types of bench marks, Study and use of dumpy level, auto level, digital level and laser level in construction industry, principle axes of dumpy level, testing and permanent adjustments, reciprocal leveling, curvature and refraction corrections, distance to the visible horizon. Contouring – Direct and indirect methods of contouring, uses of contour maps, study and use of topo-sheets, profile leveling and cross-sectioning and their applications.		
UNIT-II	Theodolite Surveying.	6 Hours
Study of vernier transit 20" theodolite, uses of theodolite for measurement of horizontal angles by repetition and reiteration, vertical angles, measurement of deflection angles using transit theodolite and magnetic bearing, prolonging a line, lining in and setting out an angle with a theodolite. Fundamental axes of theodolite: testing and permanent adjustments of a transit theodolite. Theodolite traversing – computation of consecutive and independent co-ordinates, adjustment of closed traverse by transit rule and Bowditch's rule, Gales traverse table. Checks, omitted measurements, area calculation by independent co-ordinates.		

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UNIT-III	Tacheometry Electronic Measurement Techniques and GPS	6 Hours
Tacheometry – application and limitations, principle of stadia tacheometry, fixed hair method with vertical staff to determine horizontal distances and elevations of points, finding tacheometric constants. Tacheometric contouring. Surveying using total station – Study and use of Electronic Tacheometer (Total station) types, functions (remote elevation measurements, remote distance measurements, area measurement). Global Positioning system-GPS satellite systems, components of GPS, positioning and relative positioning with GPS, Applications of GPS. Introduction to DGPS and its uses.		
UNIT-IV	Curves	6 Hours
Introduction to horizontal and vertical curves (no numerical and derivations to be asked on vertical curves and reverse curves), different types and their applications, simple and compound circular curves, elements and setting out by linear methods such as radial and perpendicular offsets, offsets from long chord, successive bisection of chord and offsets from chords produced. Angular methods: Rankine's method of deflection angles (one and two theodolite methods). (Numerical on simple circular curves and compound curves to be asked), Transition curves: necessity and types		
UNIT-V	Geodetic Surveying and triangulation adjustment	6 Hours
Geodetic Surveying : Objects, Methods of Geodetic Surveying, Introduction to triangulation, Classification of triangulation systems, Triangulation figures, Concept of well-conditioned triangle, selection of stations, Indivisibility and height of stations. Kinds of errors, Laws of weights, Determination of most probable values (MPV) of conditioned and independent quantities, Method of Least Squares, Indirect observations, Probable error and its determination, Distribution of error to the field measurements, Normal equation, Method of correlates		
UNIT-VI	Construction Survey and Hydrographic Surveying	6 Hours
Introduction to construction survey, establishing of horizontal and vertical controls, setting out of buildings, maintaining verticality of tall buildings, survey for open traverse (roadway, railways, drainage lines, water lines, canals).Hydrographic Surveying: Objects, Applications, Establishing controls, Shore line survey, Sounding, Sounding equipment, Methods of locating soundings – conventional and using GPS, Reduction of soundings, Plotting of soundings, Nautical sextant and its use, Three point problem and its use, solution of three point problem by all methods, Tides and tide gauges, determination of MSL		
Text Books : T1 T. P. Kanetkar and Kulkarni, Surveying and Levelling Vol. I and Vol. II, Pune VidyarthiGrihaPrakashan. T2 B. C. Punmia, Ashok K. Jain, Arun K. Jain , Surveying, Vol. I and II, Laxmi Publications.		
Reference Books: R1. Surveying by C. Venkatramaiah , University Press. R2. Surveying, Vol. I and II by S. K. Duggal, Tata Mc-Graw Hill. R3. Surveying and Levelling by Subramanian, Oxford University Press. R4. Essentials of GPS by N K Agarwal.		

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S .Y. B. Tech
Academic Year – 2023-2024 Semester -IV
[CE2209L] Surveying and Geomatics Lab

Teaching Scheme: LAB: -2 Hours/Week	Credit: 01	Lab Evaluation In Sem Continuous Evaluation : 30 Marks: End Sem. Exam : 20 Marks
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Course Prerequisites :Basic Geometry and Physics

Course Objective:

To use and handle the different kinds of Surveying equipments to achieve accuracy in mapping and elevation determination.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Determine the directions of survey lines, elevations of survey stations and do road project using surveying equipment's.

CO2: Generate data and use it for mapping using surveying equipment

CO3: Use advance surveying equipment for mapping.

CO4: Take observations for hydrographic Survey.

Course Contents

Lab Contents

Guidelines for Assessment

Continuous assessment of laboratory work is to be done based on overall performance and lab practicals /assignments performance of student. Each lab practical/assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

List of Laboratory Assignments/Experiments (minimum 7 to be covered)

1	Measurement of magnetic bearings of sides of a triangle or polygon, correction for local attraction and calculations of true bearings using prismatic compass.
2	Simple and differential levelling with at least three change points using level.
3	Finding horizontal and vertical distance using Tacheometer.
4	Measurement of horizontal angles (by repetition method) using Vernier Transit Theodolite.
5	Setting out a circular curve by Rankine's method of deflection angles.
6	Measurement of horizontal angles (by reiteration method) using one second Theodolite / Total station.
7	Study and use of nautical sextant and measurement of horizontal angles
8	Solution to three point problem by analytical method
9	Distance and angle measurements using Total station.

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10	Measurement and Mapping using Drone.
	Project I: Road project using Auto level for a minimum length of 100 m including fixing of alignment, profile levelling, cross-sectioning, plotting of L section and Cross Section. (One full imperial sheet including plan, L-section and any three typical Cross-sections). 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 software such as Autodesk land desktop, Auto-civil, Foresight etc. (minimum contour interval 1 meter). Project III: Traversing using a total station (up to 1 ha area)
Text Books : T1. T. P. Kanetkar and Kulkarni, Surveying and Levelling Vol. I and Vol. II, Pune Vidyarthi Griha Prakashan. T2. Dr. B. C. Punmia, Ashok K. Jain, Arun K. Jain, Surveying, Vol. I and II, Laxmi Publications.	
Reference Books: R1. Surveying by C. Venkatramaiah, University Press. R2. Surveying, Vol. I and II by S. K. Duggal, Tata Mc-Graw Hill. R3. Surveying and Levelling by Subramanian, Oxford University Press.	



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Academic Year – 2023-2024 Semester -IV

[CE2210L] Introduction to Python programming

Teaching Scheme: TH: - 0 Hours/Week TU: 01 Hours/Week LAB: 02 Hours/Week	Credit 2	Examination Scheme: Lab Evaluation In Sem. Cont. Evaluation: 30 Marks End Sem. Practical Exam: 20 Marks TW: 50 Marks
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Course Prerequisites: Basic logic development

Course Objective:

The Objective of this course is to make students learn and understand basics of programming, data structure and algorithms using Python programming language, and to apply the knowledge gained to solve computational problems.

Lab Outcome:

After successful completion of the Lab, students will able to:

CO1: Develop Python program to demonstrate use of operators and data types.

CO2: Develop Python program using lists, tuples and dictionaries.

CO3: Develop python program using Function, modules and packages.

CO4: Design Classes for given problem.

CO5: Perform file operations to read and write data in files.

Lab Contents

Guidelines for Assessment

Continuous assessment of laboratory work is to be done based on overall performance and lab assignments performance of student. Each lab Experiment and assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness

- Both internal and external examiners should jointly frame suitable problem statements for practical examination based on the term work completed.
- During practical assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation of the problem statement.
- The supplementary and relevant questions may be asked at the time of evaluation to test the student for advanced learning, understanding of the fundamentals, effective and efficient implementation.
- Encouraging efforts, transparent evaluation and fair approach of the evaluator will not create any uncertainty or doubt in the minds of the students. So adhering to these principles will consummate our team efforts to the promising boost to the student's academics.

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List of Laboratory Experiments (minimum 8 to be covered)

1	Demonstrate basic python block and data types
2	Demonstrate operators in python
3	Demonstrate decision control statement – if, if-else, elif
4	Demonstrate looping statement
5	Demonstrate Break, Continue, Pass statement
6	Demonstrate list slicing and list manipulation using in-built methods
7	Demonstrate tuple using in-built methods
8	Demonstrate set and its operation
9	Demonstrate dictionary manipulation
10	Demonstrate function using variable length arguments
11	Demonstrate String related function
12	Demonstrate data visualization using matplotlib
13	Create a class to exercise OOP features in python
14	Demonstrate File I/O operations
15	Demonstrate Exception handling in python

Text Books

T1. Allen B. Downey, Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016

T2. Guido van Rossum and Fred L. Drake Jr, “An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

Reference Books:

R1. Charles Dierbach, “Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.

R2. John V Guttag, “Introduction to Computation and Programming Using Python”, Revised and expanded Edition, MIT Press , 2013

R3. Kenneth A. Lambert, “Fundamentals of Python: First Programs”, CENGAGE Learning, 2012.

R4. Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3”, Second edition, Pragmatic Programmers, LLC, 2013.



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Academic Year – 2023-2024 Semester -IV
[HS2205T] Economics

Teaching Scheme: TH: 02 Hours/Week	Credit 2	Examination Scheme: In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks
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Course Prerequisites : Not required

Course Objective:

1. To provide students with a foundational understanding of economics, focusing on both micro and macro aspects.
2. Students will learn essential concepts such as the basic economic problem, demand and supply theories, cost analysis, market structures, and financial systems, including the money and capital markets.
3. To analyze how individual firms and economies operate, make informed decisions, and assess the impact of different mark

Course Outcome:

On completion of the course, student will be able to–

CO 1: Record the core principles of economics, including the basic economic problem and the nature of firms.

CO 2: Explain the theory of demand, supply analysis and cost analysis.

CO 3: Apply the laws of demand and supply, understand their determinants, and recognize shifts in demand and supply curves.

CO4: Calculate and interpret various cost concepts such as fixed, variable, total, and marginal costs, and use break-even analysis in decision-making

Course Contents

UNIT-I	Basic Concept of Economics	4 Hours
Introduction to Economics, Basic Economic Problem, Circular Flow of Economics (Two, Three and Four Sector Model), Nature of the Firm- Rationale, Micro and Macro Economics and their interdependence on each other, Difference between Micro and Macro Economics		
UNIT-II	Theory of Demand	4 Hours
Concept of Demand, Determinants of Demand, Demand function, Law of Demand, Demand Schedule and curve, Movement along and shift of Demand Curve, Exceptions to the law of demand		
UNIT-III	Theory of Supply Analysis	4 Hours
Meaning and concept of supply, Law of supply, Supply Schedule, Supply Curve and Shift of Supply Curve. Exception to Law of Supply		
UNIT-IV	Cost Analysis	4 Hours

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Concepts of Cost:- fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost. Break even analysis, Graphic Method and Algebraic method (Numerical from BEP)		
UNIT-V	Forms of Market and Price Determination	4 Hours
Forms of Market – Perfect Competition, Monopoly and Monopolistic Competition, Market Equilibrium– Price Determination under Perfect Competition, Monopoly and Monopolistic Markets.		
UNIT-VI	Money Market and Capital Market	4 Hours
Meaning and concept of money market, Instruments of money market, Capital Market and its instruments, Role and Functions of Reserve Bank of India		
Text Books: T1. Economic Analysis of Business Decision – Dr Meenakshi Duggal T2. Introductory Microeconomics and Macroeconomics , T.R. Jain and Dr V.K. Ohri T3. Managerial Economics – D.N. Dwivedi		
Reference Books: R1. Intermediate Microeconomics: A Modern Approach, Hal R, Varian. R2. Principles of Macroeconomics, N. Gregory		



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