COURSE TITLE	**ELEMENTS OF CIVIL ENGINEERING**
COURSE CODE	**01CI2101**
COURSE CREDITS	**4**

Objective:

1. To introduce the scope, disciplines, and societal role of civil engineering with emphasis on building materials
2. To develop basic skills in surveying, leveling, and awareness of modern surveying tools
3. To understand building planning principles, smart systems, and transportation infrastructure for sustainable development.

Course Outcomes: After completion of this course, student will be able to:

1. Understand the evolution, scope and role of civil engineering in nation-building and society.
2. Identify and classify conventional, sustainable and modern building materials based on their properties and applications
3. Apply basic surveying and leveling technique sand recognizes modern surveying tools like GPS and Total Station.
4. Interpret building planning principles, smart systems, and transportation infrastructure, including IoT and 3D printing

Pre-requisite of course: None

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Overview of Civil Engineering and Building Materials** Evolution and broad disciplines of civil engineering, Role of civil engineers in society and nation building, Landmark project and works of eminent civil engineers, scopes for a career as a civil engineer., Convectional Material: Stone, bricks, cement, timber, steel, aggregates (properties, uses, simple field tests), Sustainable & Emerging Materials Fly-ash bricks, AAC (Autoclaved Aerated Concrete) blocks, Recycled aggregate and Geopolymer Concrete, Sustainable & Emerging Materials Fly-ash bricks, AAC (Autoclaved Aerated Concrete) blocks, Recycled aggregate and Geopolymer Concrete	14

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Contents : Unit	Topics	Contact Hours
2	**Surveying & Leveling** Introduction: Applications, fundamental principles and classification of surveying, classification of plans & maps., Linear Measurement: Methods, instruments used in linear measurement, selection of stations, ranging, offsetting., Angular Measurement: Introduction, types of compasses, types of meridians and bearings, measurement of bearings, computation of angles, Leveling: Aims and applications, definition of various terms, instruments for leveling, methods of leveling, recording observations in level-book, computing reduced levels by HI and rise &fall method., Modern Surveying Tools: Introduction to Theodolite, total station, GPS, Remote Sensing& basics of drone Surveying (Concept only)	17
3	**Building Planning, Construction & Smart Systems** Classification of buildings, types of load acting on building, building components & their functions and principles of planning., Smart Building Systems Understand the concept of smart building, the role of Iot in controlling, lighting, security and energy use and basics of 3D Printing in construction	7
4	**Transportation Engineering** Role of transportation in national development, modes of transportation, types of roadways, Introduction of traffic engineering, Introduction to urban transportation system-BRTC and Metro,	4
Total Hours		**42**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Experiment-1 Linear Distance Measurement Using Chain/Tape Surveying** Students will measure horizontal distances on the ground accurately using a chain or tape.	2
2	**Experiment-2 Identifying Good vs. Defective Bricks in Field** Collect brick samples, perform field tests (drop test, water absorption, soundness), and classify them as good or defective based on IS specification	2
3	**Experiment-3 Identifying Fresh vs. Deteriorated Cement in Field** Students will identify and distinguish between fresh and deteriorated cement in the field based on simple physical tests and observations	2
4	**Experiment-4 Measurement of Horizontal Angle with a Surveying Compass** Set up a surveying compass, measure horizontal angles between three fixed points, and record observations in a tabular form.	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
5	**Experiment-5 Measurement of Horizontal Angles Using a Prismatic Compass** Use a prismatic compass to measure included angles of a closed traverse; record fore and back bearings and record observations in a tabular form	4
6	**Experiment-6 Identify, Classify, and Interpret Different Traffic Signs and Road Symbols** Field/virtual activity: identify 15–20 traffic signs, classify them into regulatory, warning and informatory categories	2
7	**Experiment-7 Preparation of a Residential Building Plan in Accordance with Building Planning Principles** Using drawing sheets or CAD software, prepare a simple residential building plan considering ventilation, orientation, circulation and bye-laws.	4
8	**Experiment-8 Reduced Level Determination Using Height of Instrument Method** Student will determine and record the reduced levels of given ground points systematically using the Height of Instrument (HI) method, and present the results in tabular form with proper calculations.	4
9	**Experiment-9 Reduced Level Determination Using Rise and Fall Method** Student will determine and record the reduced levels of given ground points systematically using Rise and Fall method, and present the results in tabular form with proper calculations.	4
10	**Experiment-10 Orientation to the Modern (AI and IoT Enabled) Surveying Methods for Various Civil Engineering Infrastructures** Screening of Technical Video Lectures and Some Case Studies	2
Total Hours		**28**

Textbook :

1 Introduction to civil Engineering, Bhogayata, Shah & Vora, Tata McGraw hill, 2022

References:

1 Highway & Transportation engineering, Highway & Transportation engineering, Khanna & Justo, Nem Chand & Bros., 2018

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery

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Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
30.00	30.00	15.00	15.00	10.00	0.00

Instructional Method:

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
2. Lectures will be taken in class room with the use of multi-media presentations, black board – mix of both
3. Attendance is compulsory in lectures and laboratory which carries a 5% component of the overall evaluation.
4. Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation
5. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5%
6. Surprise tests/Quizzes will be conducted which carries 5% component of the overall evaluation.
7. The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures. Minimum 8 experiments are planned based on the course content.

Supplementary Resources:

1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://cphbooks.in/pdf/Element_of_Civil_Engineering.pdf
2. https://archive.org/details/elementsofcivile0000saik

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