

# GUJARAT TECHNOLOGICAL UNIVERSITY

## ELEMENTS OF CIVIL ENGINEERING

**SUBJECT CODE: 2110004**

**B.E. 1<sup>st</sup> YEAR**

**Type of course:** Civil Engineering

**Prerequisite:** Knowledge of physics and mathematics up to 12 science level.

**Rationale:** Basic Civil Engineering knowledge is essential for all Engineers.

### Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE Viva (V)	PA (I)	
4	0	2	6	70	30*	30	20**	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment

### Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	<b>Introduction:</b> Branches of Civil Engineering, Scope of Civil Engineering, Role of Civil Engineer in Society. Impact of infrastructural development on economy of country.	02	6%
2	<b>Surveying, Leveling and Mapping:</b> <b>Introduction:</b> Definition of Surveying, Aims and applications, Fundamental principles of surveying, Classification of surveying, Plans and maps, Scales, Units of measurement.	05	10%
	<b>Linear Measurement:</b> Methods, Instruments used in chain surveying, Selection of stations, Chaining, Ranging, Offsetting, Errors in chaining and correction, Conventional symbols.	05	10%
	<b>Angular Measurement:</b> Instruments used, Types of compass, Types of meridians and bearings, Measurement of bearings, computation of angles. Compass traversing and correction of bearings for local attraction.	05	10%
	<b>Leveling:</b> 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, Definition of contour, Characteristics of contours of different terrains and application of contour maps, Introduction	06	12%

	to planimeter, introduction to Global positioning system(GPS), remote sensing(RS) and Geographical information system(GIS)		
3	<b>Building Materials and Construction:</b> <b>Materials:</b> Introduction to construction materials like Stone, Bricks, Lime, Cement, Timber, Sand, Aggregates, Mortar, Concrete and bitumen. <b>Construction:</b> Classification of buildings, Types of loads acting on buildings, Building components and their functions and nominal dimensions.	05	10%
		04	10%
4	<b>Building Planning and Drawing:</b> Definition and concept of plan of a simple residential building, Elementary principles and basic requirements for building planning, elevation and section of a residential building.	06	12%
5	<b>Water Resources:</b> Hydrologic cycle, water use and its conservation, Introduction to dams, weirs, barrages and check dams.	05	10%
6	<b>Transportation Engineering:</b> Role of transportation in national development, Modes of transportation, Introduction to road traffic and traffic control, Introduction to mass transportation system.	05	10%

#### Reference Books:

1. Title: Surveying Vol. I Author: Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain 16<sup>th</sup> Edition Publisher: Laxmi Publication Delhi
2. Title: Surveying Theory and Practice (7<sup>th</sup> Edition) Author: James M Anderson and Edward M Mikhail Publisher: McGraw Hill Education, India Pvt. Ltd.
3. Title: Surveying and Leveling Author: R. Subramanian Publisher: Oxford University
4. Title: Surveying and Leveling Author: N. N. Basak Publisher: Tata McGraw Hill Education, Pvt. Ltd. New Delhi
5. Title: Surveying Vol. I Author: S. K. Duggal Publisher: Tata McGraw Hill Publication New Delhi
6. Title: Elements of Civil Engineering Author: Dr. R.K. Jain and Dr. P.P. Lodha Publisher: McGraw Hill Education, India Pvt. Ltd.
7. Title: Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill
8. Title: Civil Engg. Drawing Author: S. C. Rangwala Publisher: Charotar Pub. House Anand
9. Title: Building Construction Author: Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain Publisher: Laxmi Pub. Delhi
10. Title: Building Construction and Construction Material Author: G.S.Birdie and T.D. Ahuja Publisher: Dhanpat Rai Publishing Company

11. Title: Engineering Material Author: S.C. Rangwala Publisher: Charotar Pub. House, Anand
12. Title: Irrigation Engineering and Hydraulic Structures Author: Santoshkumar Garg Publisher: Khanna Publishers Delhi
13. Title: Highway Engineering Author: Khanna S. K. and Justo C. E.G. Publisher: Nemchand and Brothers

### **Course Outcome:**

After learning the course the students shall be able to:

1. Carry out simple land survey to prepare maps with existing details.
2. Find out area of irregular shaped plane figures.
3. Understand building plan elevation and section.
4. Get acquainted with construction materials.
5. Get acquainted with hydrological cycle and hydraulic structures.
6. Get acquainted with mass transportation systems.

### **List of Practical:**

1. Chain survey
2. Compass survey
3. Leveling

### **Project:**

Based on practical students shall perform following projects.

1. Chain and compass survey project
2. Profile leveling and contouring

### **Tutorial:**

- I. Each student shall prepare a plan, elevation and section of a simple residential building from given data
- II. Students shall draw following sketches and show typical dimensions
  - Cross sections of various types of foundations
  - Cross section of chhajja with lintel
  - Cross section of slab
  - A typical door
  - A typical window
  - Cross section of floor with typical dimensions
- III. Students shall measure area of given irregular shaped figure with planimeter

### **Major Equipments:**

1. Prismatic compass
2. Level
3. Metric chain
4. Prism square
5. Planimeter

6. Line ranger
7. Leveling staff

\*PA (M): 10 marks for Active Learning Assignments, 20 marks for other methods of PA

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus of Elements of Civil Engineering is covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should be sent to [achievements@gtu.edu.in](mailto:achievements@gtu.edu.in).

\*\* PA (I): 10 marks for a case study of Systems, 10 marks for other methods of PA.

The case study of Systems: The case study should be of a working EE system, which shows the working of the concepts, included in the Syllabus.