GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering

Level: UG

Branch: ALL

Course / Subject Code: BE01R00101

Course / Subject Name: Basic Civil Engineering

w. e. f. Academic Year:	2024-25
Semester/Year	Ist Year
Category of the Course:	ESC

Prerequisite:	**NA**
Rationale:	Infrastructure development has been the main focus area for developing country like India. Housing, Road, bridges, public transportation systems and sanitation can be considered as indicators for development of the country. In view of this, it is essential for all engineering graduates to know the basic aspects of civil engineering. This subject deals with planning and construction of building, construction materials, surveying, quality parameters of water and wastewater, water shed management and overview of other infrastructural needs of a city.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Apply the basic knowledge of different building materials used in construction.	U
02	Interpret plans, components and methods of construction for the building.	A
03	Identify quality of water and wastewater and methods of water conservation.	U
04	Know the use of basic equipment required for linear and angular measurements	A
05	Comprehend need and types of mass transportation systems and advances in civil engineering.	U

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching - Learning Scheme (in Hours per Semester)					Total Credits = TH/30	Assessment Pattern and Marks					Total Marks
						Theory		Tutorial / Practical			
L	T	P	TW/SL	TH		ESE (E)	PA (M)	PA/ (I)	TW/ SL (I)	ESE (V)	
45	0	30	45	120	04	70	30	20	30	50	200

Where L = Lecture, T= Tutorial, P= Practical, TW/SL = Term-Work / Self-Learning, TH = Total Hours, ESE = End-Semester Examination, PA = Progressive Assessment

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction of Civil Engineering and Building materials:** Introduction, branches of civil engineering, scope, role of a civil engineer, units of measurements and its conversion. Type, properties and applicability of building materials: cement, aggregate, brick, steel, concrete, stone, soil, mortar, timber, plastic, epoxy, fly-ash, metal slags, bitumen, optical fiber, pipes, wires and cables, FRP and emerging smart and recycled materials.	7	16
2.	**Building planning and construction:** Definitions of terminologies related to building plan, working drawings, principles of planning, types of building, preparation of plan elevation and section of a residential building, symbols used for electrical and sanitary services, building components and its functions, loads acting on the building, elementary concepts of brick and stone masonry. Town planning, necessity and principles, Origin of town, Growth of town, Land use, Principles and objects of zoning, Advantages of zoning, Low-cost housing, Building automation	12	27
3.	**Quality parameters of water and wastewater and sanitary systems** Sources of water, quality characteristics of drinking water and domestic wastewater, drinking water standards, methods for disposal of wastewater, types of sewerage system, types of building services like plumbing & sanitation, water supply & drainage system, house drainage system, elementary concepts of solid waste management.	8	17
4.	**Introduction to surveying and levelling:** Introduction to surveying, fundamental principles, classification. **Linear measurement**: Instruments used, chaining on plane ground, offset, ranging. **Angular measurement:** Types of compass, meridian and bearing, local attraction, traverse surveying. **Leveling:** Instrument used, terminology, types of leveling, methods of leveling, contours and its characteristics. **Modern tools:** Introduction to theodolite, auto-level, total-station, EDM. Introduction to GPS survey and Drone survey	12	27
5.	**Advances in Civil Engineering** Smart city and it's features, green building, earthquake resistant structures, mass transportation systems (BRTS, metro, mono rail,), bullet train, watershed management, Sardar Sarovar dam, Kalpsar	6	13

	project, Narmada canal network, Water conservation, and rain water harvesting, river front development		
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
35	**40**	**25**	**-**	**-**	**-**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Surveying volume I and II by Dr. B.C. Punmia, Laxmi Publications.
2. Surveying and levelling by N.N. Basak, Tata Mcgraw Hill Education.
3. Building Construction by Dr. B.C. Punmia, Laxmi Publications.
4. Engineering Materials by R.C. Rangwala, Charotar Publications.
5. Building planning, designing and scheduling by Gurucharan Singh, Standard Publisher.
6. Environmental Engineering volume I and II by S.K.Garg, Khanna Publishers.
7. Basic Civil Engineering by S. Ramamrutham, Dhanpatrai Publication.
8. Basic Civil Engineering by M.S.Palanichamy, McGraw Hill
9. Basic Civil Engineering by Satheesh Gopi, Pearson Publisher

(b) Open source software and website:

1. http://nptel.ac.in/courses/105107122/
2. http://nptel.ac.in/courses/105107157/
3. http://nptel.ac.in/courses/105101087/
4. http://nptel.ac.in/courses/105104100/

Suggested Course Practical/Assignment List:

1. Unit conversation exercise.
2. Assignment based on building material and field visit for material identification.
3. Identification of components of building (field visit/models) and assignment related to it.
4. Planning of a residential building (plan, elevation & section of a residential building)

5. Linear and angular measurements (Chain and Compass) (in field with instrument)
6. Determination of R.L of a given point by Dumpy level/auto-level. (in field with instrument)
7. Assignment based on numerical of surveying and levelling.
7. Introduction to Theodolite & total station.
8. Presentation on BRTS/Metro/Monorail/Bullet train.
9. Seminar on green building & smart city.

List of Laboratory/Learning Resources Required:

Chain, tape, compass, dumpy level, auto-level, theodolite, total station, EDM, models related to building components and services.

Suggested Project List:

1. Chain and Compass Traverse Survey
2. Profile leveling

Suggested Activities for Students:

Explore web content related to smart cities, green building, mass transportations systems, emerging building materials etc.

- **Activities suggested under self-learning:**

Sl. No.	Name of the activity	No. of hours	Evaluation Criteria
1.	Industry/Research laboratory/Village/Places of National Importance visit	Visit = 5h, Report preparation = 5h Total = 10h	Based on report submitted. Report should contain observations and calculations based on industry/ lab data.
2.	Technical Video based learning related to the subject	Duration of video = 5h Report preparation = 5h Total = 10h	Report /presentation based on the video learning outcomes.
3.	Assignment writing. Numerical based assignment is preferable.	5 assignments of 2h each. Total = 10h	Based on the assignment submitted.
4.	Problem solving/Coding using C, C++, Python, SCILAB, MATLAB, MS-EXCEL or any	5 small coding-based assignment of 2h each. Total =	Based on the coding solution submitted.

	other relevant software	10h	
5.	On-line courses related to the subjects	Minimum duration of the course should be 10h.	Examination based assessment at the end of course. Based on the certificate produced.
6.	Videos on Industrial safety aspects based on subject	Duration of video = 5h Report preparation = 5h Total = 10h	Based on quiz/report submitted
7.	Poster/chart/power point preparation on technical topics	Duration = 6 h	Based on poster/chart preparation and presentation skills
8.	Working/non-working model on technical topics	Working = 12 h Non- working = 8 h	Based on inter department/external evaluation
9.	Group Discussion on emerging/trending technical topics based on subject	Duration = 1 h each	Based on performance in group discussion, technical depth, knowledge etc.
10.	Real world case studies-based learning	Duration of data collection/study = 5h Report preparation = 5h Total = 10h	Based on in-depth study, technical depth, data collected, fact finding, etc.
11.	Field survey of 1 to 2 days	Duration = 10 h Data collection, representation & interpretation	Based on need of the data for various societal/governance/Industry scheme/project

Note:
1. All the suggested activity should be related to the subject.
2. The number of hours are suggestive. Faculty can sub-divide the number of hours based on the activity. However, total number of hours is fixed.
3. Minimum 03 activities shall be covered per subject.
4. Rubrics for the evaluation can be prepared by the faculty.

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