



# GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering

Level: UG

Branch: Civil Engineering

Subject Code: BE03006031

Subject Name: Building Construction And Technology

w. e. f. Academic Year:	2024-25
Semester/Year	3
Category of the Course:	Professional Core Course

<b>Prerequisite:</b>	Introduction to Basics of Civil Engineering and Construction Materials
<b>Rationale:</b>	The development of a basic understanding about the construction of different type of Structures and application of the basic principles of Engineering to solve real life problems in construction practices is necessary for civil engineers. Advancement in the technologies for the construction of building structures as per current demand is the need of the present era.

## Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
CO-1	Develop understanding about structural stability and importance of types of foundation.	BL2
CO-2	Recognize the associated entities involved in building construction process.	BL3
CO-3	Identify the factors to be considered in selection of construction of different building components	BL4
CO-4	Understand the practices and techniques for Temporary/Special construction Works.	BL2
CO-5	Learning to further research in sustainable civil construction technology and Green building	BL4

*\*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
L	T	P	TW/SL	TH		Theory		Tutorial / Practical			
						ESE (E)	PA (M)	PA/ (I)	TW/ SL (I)	ESE (V)	
45	00	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



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## Course Content:

Sr. No.	Course Content	No. of Hours	% of Weightage
1	Foundations: Requirement and necessity of foundation, failures of foundation and remedial measures. Subsurface Investigation for foundation. Types of foundations - Shallow Foundation: its types and conditions under which they are used, Deep Foundation: Types of deep foundation-Pile Foundation and its types, pile driving/ boring methods, causes of failures of piles. Well foundation- types of caissons, loads on caisson, design features of caissons, sinking of caisson, caisson diseases	12	25
2	Masonry Construction : Stone masonry: Technical terms, joints, Classification of Stone masonry. Brick masonry: Technical terms, bonds in brick work. Other Masonry: Composite masonry, Hollow blocks masonry, Partition Wall, Cavity walls, Lintels & arches: its types and construction. Wall Finishes: Plastering, pointing and painting	6	20
3	Plain and Reinforced Cement Concrete Construction: Pre-cast and cast-in-situ Construction, Concrete 3D printing. Form work: Form work for R.C.C. Wall, slab, beam and column, centering for arches of large spans, slip formwork – Horizontal & Vertical systems	4	10
4	Building Components: Doors and Windows : technical terms, size, types, suitability, fixtures and fastenings, Ventilators Stairs and Staircases: Definition, technical terms, requirements of good stair, classification, stair design/planning, Lifts, elevators, escalators. Floorings: Introduction, essential requirements of a floor, factors affecting selection of flooring material, Roofs and Roof Coverings: Introduction, requirements of good roof, technical terms, classification, types of roof coverings, advantages and disadvantages of different types of roofing.	10	20



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5	Special Works: Timbering in trenches, Control of Ground water in excavation, types of scaffoldings, shoring, underpinning, Coffor Dams, Diaphragm Walls, Demolition of structures and site safety. Special Treatments: Fire resistant, water resistant, thermal insulation, acoustical construction and anti-termite treatment.	6	15
6	Introduction and Principles of Sustainable building and BIM, Green Building and rating system for green building. Examples and some Case studies	4	10

theory):

## Distribution of Theory Marks (in %)

R Level	U Level	A Level	N Level	E Level	C Level
10	20	30	20	10	10

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. Building Construction by B. C. Punamia
2. Building Construction by S. C. Rangwala
3. Building Construction by Gurucharan Singh
4. Heavy Construction by Vazirani & Chandola
5. Building Construction by Sushil Kumar
6. Building Construction by P.C Varghese, Prentice-Hall of India, New Delhi
7. Hand book of Heavy construction: O'Brien, Havers & Stubb
8. Bureau of Indian Standard

### (b) Open source software and website:

1. <http://nptel.ac.in/>

## Suggested Course Practical/Assignment List:

The students will have to do the assignment and practical work which must contain sketches and drawings after field visit of constructional elements and should follow the DTE laboratory manual. Practical work related to field tests for bricks, cement and aggregates should be performed.

- Assignment -1: Foundations & Setting Out work



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- Assignment -2: Masonry Construction
- Assignment -3: Plain and Reinforced Concrete Construction
- Assignment -4: Doors and Windows
- Assignment -5: Stairs and Staircases
- Assignment -6: Floorings
- Assignment -7: Roofs and Roof Coverings
- Assignment -8: Temporary/Special Works
- Assignment -9: Special Treatments
- Assignment -10: Green Building and BIM

## List of Laboratory/Learning Resources Required:

Site visit- The student shall visit the construction site under supervision of faculty member /Site In-charge and prepare a brief report containing sketches and photographs of site visits based on the manual/ assignments.

### • Activities suggested under self-learning

Sl. No.	Name of the activity	No. of hours	Evaluation Criteria
1.	Industry visit –Construction Industry, cement industry, ceramic industry, tile industry and steel industry etc. related to Civil Engg.	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 topics of the course & new/emerging technology.	Duration of video = 5h Report preparation = 5h Total = 10h	Report /presentation based on the video learning outcomes.
3.	Assignment writing. Numerical based assignment related to topics of the course	5 assignments of 2h each. Total = 10h	Based on the assignment submitted.
4.	Problem solving/Coding using any programming language or application of software related to civil engineering	5 small coding-based assignment of 2h each. Total = 10h	Based on the coding solution submitted.
5.	Self learning on-line courses related to	Minimum duration of	Examination based



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	structural analysis, concrete technology , Building construction and BIM	the course should be 10h.	assessment at the end of course. Based on the certificate produced.
6.	Complex problem solving related to building construction, leakage problem and concreting in water etc	Maximum 2 problem. Study of the problem and solution finding, Total = 10h	Based on the depth of the solution submitted.
7	Videos on safety aspects of workers working at construction sites and safety aspects of equipment used for high rise building construction and concreting.	Duration of video = 5h Report preparation = 5h Total = 10h	Based on quiz/report submitted
8	Discussion on research papers related to civil structures, BIM and facilities etc.	4 hours per research paper. Maximum 15 h	Summarize research paper and evaluation critical parameters
9.	Poster/chart/power point presentation on topics such as Rain water harvesting, fire fighting systems etc. in high rise buildings, sustainable structures, earthquake resistant buildings etc.	Duration = 6 h	Based on poster/chart preparation and presentation skills
10	Working/non-working model on technical topics related to building construction and civil engineering structures	Working = 10 h Non- working = 8 h	Based on inter department/external evaluation
11.	Group Discussion on emerging/trending technical topics related to civil engineering structures, different types of concretes and buildings	Duration = 02 h each	Based on performance in group discussion, technical depth, knowledge etc.
12.	Real world case studies-based learning for state-of-the-art/new technology in building construction	Duration of data collection/study = 5h Report preparation = 5h Total = 10h	Based on in-depth study, technical depth, data collected, fact finding, etc.
13.	Use of Professional software for structural analysis, Building information management, Concrete mix designs etc.	Duration = 10 h	Depending on the complexity of the Application/Software
14.	Studies/surveys on requirements related to services in building like water supply,	Duration = 10 h	Based on in-depth study, data collected,



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	drainage, solar power and other facilities		fact finding and suggestions etc.
15.	Workshop/seminar attended related to civil engineering	Duration = 4 hrs per Workshop and 2 hrs per seminar attended. Maximum 10 hrs	Based on report submitted of summary and outcome of workshop/seminar attended

**Note:**

- All the suggested activity should be related to the subject.
- 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.
- For a course, minimum 3 to 4 activities shall be conducted. There is no limit for maximum number of activities; however any activity shall not be more than 10 hrs.
- Rubrics for the evaluation can be prepared by the faculty.
- All records pertaining to the evaluation and assessment of self-learning activities must be properly maintained and preserved at the institute level. These records should be made available to the university upon request.
- Institutes are encouraged to utilize digital platforms, such as Microsoft Teams, for effective record-keeping and to ensure transparency in the evaluation and assessment of self-learning activities.

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