

GANPAT UNIVERSITY				
FACULTY OF DIPLOMA ENGINEERING				
Programme	Diploma in Civil Engineering			
Semester	IV	Version	1.0.0.0	
Effective from Academic Year	2026-27	Effective for the batch Admitted in	JULY 2025	
Course code	1CI4105	Course Name	Concrete Technology	

I. TEACHING-LEARNING AND ASSESSMENT SCHEME																			
Course Type	Course code	Course Title	Teaching & Learning Scheme									Examination Scheme							
			Credit				Actual Contact Hrs/week			SLH	Total Learning Hrs/Week	TH			PR			SLA	Total
			CL	TL	LL	Total	CL	TL	LL			CE	SEE	Total	CE	SEE	Total		
DSC	1CI4105	Concrete Technology	3	0	1	4	3	0	2	3	8	40	60	100	30	20	50	20	170

Abbreviation:	CL- Classroom Learning	TL - Tutorial Learning	LL - Laboratory Learning
	SLH - Self Learning Hours	NLH - Notional Learning Hours	SLA - Self Learning Assessment
	FA - Formative Assessment (Term work +Mid Sem Exam +Attendance)		SA - Summative Assessment

II. PRE-REQUISITES				
Basic knowledge of engineering materials for the construction of various structures, particularly cement, aggregates, and water, and their roles in concrete production and performance.				
III. INDUSTRY / EMPLOYER EXPECTED OUTCOMES				
Upon completing this course, students are expected to have a solid understanding of concrete materials, mix design, and quality control procedures. They should be able to select and use appropriate materials for different concrete applications, design concrete mixes that meet strength and durability requirements, and apply proper construction practices for mixing, placing, and curing concrete.				
IV. COURSE LEARNING OUTCOMES				
CO1. Identify the properties and functions of materials like cement, aggregates, water, and admixtures. CO2. Analyze workability, consistency, and setting behaviour of fresh concrete using standard tests. CO3. Evaluate strength, durability, shrinkage, and the effects of curing of hardened concrete. CO4. Apply mix design principles to achieve desired strength, durability, and workability of concrete. CO5. Understand types of special concrete and the role of chemical admixtures in concrete. CO6. Recognize crack causes and apply prevention and repair techniques.				
V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:				
Name of Unit	Theory Learning outcomes (TLO's) aligned to CO's	Learning Content mapped with Theory Learning outcomes (TLO's) & CO's	Marks	Hours
Unit-1 Materials for Concrete	TLO 1.1 Evaluate physical properties of cement. TLO 1.2 Evaluate Physical Properties of sand and aggregates used in concrete. TLO 1.3 Test quality of water used in concrete.	1.1 Importance of cement in preparation of concrete, chemical compound of ordinary Portland cement, Bougue's compounds and its functions. 1.2 Types and Grades of cement and its uses. 1.3 Physical properties- Fineness, consistency of Cement, IST & FST, Soundness & Compressive Strength of cement and its I.S. Requirements, Its importance & their related test as per Indian Standards. 1.4 Role of Course & Fine Aggregates	08	08

		in Concrete, Classifications of aggregate on the basis of its size, shape, texture and weight Sieve Analysis, Water Absorption Specific Gravity of Fine aggregate & Coarse Aggregate, Coarse Aggregate Impact Value, Crushing Value & Abrasion Value, Flakiness & Elongation Index, its importance & their related Test as per Indian Standards. 1.5 Requirements of quality for water in concrete.		
Unit-2 Fresh Concrete	TLO 2.1 Evaluate workability, harshness, segregation and bleeding properties of fresh concrete. TLO 2.2 List the factors affecting workability. TLO 2.3 Describe methods of measurement of workability, slump test & compaction factor test. TLO 2.4 Describe methods of mixing concrete. TLO 2.5 Describe methods of compaction of concrete. TLO 2.6 Describe methods of Curing. TLO 2.7 List Effect of curing on development of strength of concrete.	2.1 Fresh concrete and its properties - Workability, harshness, Segregation and Bleeding. 2.2 Factors affecting workability 2.3 Methods of measurement of workability Slump Test & Compaction Factor Test 2.4 Relation between workability and Strength of concrete 2.5 Methods of mixing of concrete – Hand & Machine Mixing and its Transportation and Placing 2.6 Methods of compaction of concrete and its suitability 2.7 Factors affecting compaction. 2.8 Curing and its importance, its methods and suitability. 2.9 Effect of curing on development of Strength of concrete.	12	09
Unit-3 Hardened Concrete	TLO 3.1 Evaluate Properties of Hardened Concrete. TLO 3.2 Describe the steps to conduct Non-Destructive Test of Concrete.	3.1 Hardened Concrete and its Properties 3.2 Compressive Strength, Tensile Strength, Bond Strength, Flexure Strength Durability, impermeability 3.3 Factors affecting Compressive Strength 3.4 Creep of Concrete & its effect, factors affecting Creep 3.5 IS Test Procedure to find Compressive & Tensile Strength of Concrete, Acceptance Criteria, Mean Strength & Standard Deviation 3.6 Durability of Concrete & factors affecting it 3.7 Economy of Concrete & factors affecting it 3.8 Methods of Non-Destructive Test of Concrete Rebound Hammer	12	09

		Test, Ultrasonic Pulse Velocity Test. 3.9 Importance of NDT		
Unit-4 Concrete mix Design	TLO 4.1 Design Concrete Mix as per IS method.	4.1 Factors affecting quality of concrete, Advantages of Quality control 4.2 Concrete Mix Design and its importance 4.3 Nominal Mix and Design Mix 4.4 Factors affecting concrete mix design 4.5 Different methods of Mix Design and its suitability 4.6 I.S. method to design a concrete mix as per IS 10262-2009. 4.7 Example of Mix design as per I.S Method.	10	07
Unit-5 Special Concrete & Chemical Admixtures	TLO 5.1 Explain various types of special concrete and their use. TLO 5.2 Explain properties of various types of concrete.	4.1 Special Concrete: Properties, Advantages and limitations of the following types of Special Concretes: Light weight concrete, Plum concrete, Fibre reinforced concrete, Polymer concrete, High density concrete, no fines concrete, Ferro cement, Fly ash concrete, Pumped Concrete, Ready mix concrete. Self-Compacting Concrete (SCC), Pervious Concrete, Recycled Aggregate Concrete, High performance Concrete. 4.2 Admixtures and its benefits, Types of Admixtures - Accelerator and Retarder Plasticizer and Super Plasticizer Water roofing and Air entraining admixture. 4.3 Utility of Admixtures.	12	06

Unit-6 Prevention & Repair Techniques For cracks in Concrete	TLO 6.1 Explain various types of cracks in concrete structures and them causes. TLO 6.2 Explain methods to prevent and repair the cracks.	5.1 Deterioration of concrete and 5.2 Corrosion of reinforcement 5.3 Types of deteriorations and its Effects. 5.4 Prevention of concrete Deterioration. 5.5 Effect of corrosion of reinforcement in concrete and remedial. 5.6 Types, causes and remedies of concrete cracks before hardening 5.7 Types, causes and remedies of concrete cracks after hardening Prevention of cracked Concrete. 5.8 Materials for repair of cracks, Methods used for repair of cracked Concrete.	06	06
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VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL			
Sr. No.	Practical/Laboratory Learning Outcome (LLO)	Practical Titles	Relevant COs
1	LLO 1.1 Determine compressive strength of cement.	Compressive Strength of Cement	CO3
2	LLO 1.2 Determine Fineness (with sieve) and Soundness of cement.	Fineness and Soundness of Cement	CO1
3	LLO 1.3 Grading of Fine and Coarse Aggregate	Grading of Aggregates	CO1
4	LLO 1.4 Determine Flakiness and Elongation index of coarse aggregate.	Flakiness and Elongation Index of Coarse Aggregate	CO1
5	LLO 1.5 Determine Impact, Crushing value of coarse aggregate.	Impact and Crushing Value of Coarse Aggregate	CO1
6	LLO 1.6 Measure workability of concrete by slump test and compaction factor test.	Workability of Concrete (Slump & Compaction Factor)	CO2
7	LLO 1.7 Evaluate the compressive strength of concrete specimens to ensure they meet the required performance standards..	Compressive Strength of Concrete Specimens	CO3
8	LLO 1.8 Use a rebound hammer to assess the surface hardness and quality of concrete without damaging it.	Non-Destructive Testing of Concrete (Rebound Hammer)	CO3
9	LLO 1.9 Design concrete mix proportions according to IS: 10262 to achieve the desired strength, workability, and durability.	Concrete Mix Design (IS:10262 Guidelines)	CO4

VII. SUGGESTED MICRO PROJECT / ASSIGNMENTS / ACTIVITIES FOR SELF LEARNING / SKILL DEVELOPMENT (SELF LEARNING)
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1. **Concrete Mix Design Analysis:** Choose a real-world construction project and analyze the concrete mix design used, justifying the choice of materials based on strength and durability requirements.
2. **Material Comparison Chart:** Create a visual comparison of different types of cement, aggregates, and admixtures, highlighting their properties and applications in concrete production.
3. **Concrete Curing Methods:** Research and present various concrete curing methods, comparing their effectiveness in enhancing concrete strength and durability. Prepare a report or poster summarizing findings.
4. **Visit to a Concrete batching Plant:** Visit a local concrete batching plant or site, observe the production process, and prepare a report on the concrete mix design, batching process, and quality control procedures.

VIII. LIST OF INSTRUMENTS / EQUIPMENT / TRAINER BOARD

1	Aggregate Impact testing machine
2	Aggregate Crushing test apparatus
3	Slump Cone Test apparatus
4	Los Angeles aggregate abrasion testing machine
5	Vibrating table for concrete moulds
6	Electronic Weighing balance, Different size concrete moulds, Oven, Gauging Trowel, Shovel, Sieve set, Small and big Containers etc
7	Rebound Hammer
8	Le- Chatelier test apparatus and other relevant assembly
9	Compaction factor test apparatus
10	Assembly of compressive strength of cement determination along with a cement cube vibrating machine.
11	Different types of Concrete Moulds
12	Tools and Containers for mixing of concrete mixture
13	Compression testing machine
14	IS sieves for Fine & Coarse aggregates
15	Thickness gauge & Elongation gauge with other relevant assembly

IX. LIST OF REFERENCE BOOKS

Sr.No.	Title	Author	Publication
1	Concrete Technology Theory and Practice	M S Shetty	S Chand & Company Ltd, New Delhi ISBN-13:978-9352533800
2	Concrete Technology	Shanthakumar A R	Oxford University Press, New Delhi ISBN-13: 978-0199458523
3	Concrete Technology Theory and Practice	M L Gambhir	McGraw Hill Education (I) Pvt Ltd, New Delhi ISBN-13: 978-1259062551

X. LINK OF LEARNING WEB RESOURCE

1	www.nptel.ac.in
2	www.indianconcreteinstitute.org
3	www.sciencedirect.com
4	www.researchgate.net

XI. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	Materials for Concrete	CO1	08	2	4	2	8

