



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Diploma Engineering College
Semester-3

Subject : Concrete Technology – DETCV13206

Type of course: Multidisciplinary

Prerequisite: Concrete Technology

Rationale:

After learning Construction material and technology in 2nd semester, this subject "Concrete Technology" is introduced in 3rd semester. Concrete is the most widely used man-made construction material in the world and is second only to water as the most utilized substance on the planet. It is the material of choice where strength, impermeability, durability, performance, fire resistance and abrasion resistance are required. It plays an important role in nation building through infrastructure and private building construction. The knowledge of concrete and its properties in the plastic condition and in hardened condition are highly important in order to make Civil Engineering structure safe and serviceable. This course focuses on students' acquisition of knowledge, skills & practices in concrete works and also focuses on the recent advances in the field of concrete technology with emphasis on quality control of concrete.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
3	0	2	4	60	30	10	20	30	150

Legends: CI-ClassRoom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Unit No.	Course content	Hrs	% Weightage
1.	Materials for Concrete Importance of cement in preparation of concrete, Chemical compound of ordinary Portland cement, Bogue's compounds and its functions, Types, and Grades of cement and its uses, 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, Role of Coarse & Fine Aggregates in Concrete, Classifications of aggregate based on its size, shape, texture and weight Sieve Analysis, Water Absorption Specific Gravity	9	20



	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, Requirements of quality for water in concrete, Admixtures and its benefits, Types of Admixtures, Utility of Admixtures.		
2.	Fresh Concrete Fresh concrete and its properties, Factors affecting workability, Methods of measurement of workability, Relation between workability and strength of concrete, Methods of mixing of concrete and its Transportation and Placing, Methods of compaction of concrete and its suitability, Factors affecting compaction, Curing and its importance, its methods, and suitability, Effect of curing on development of strength of concrete.	9	20
3.	Hardened Concrete Hardened Concrete and its Properties, Compressive Strength, Tensile Strength, Bond Strength, Flexure Strength, Durability, impermeability, Factors affecting Compressive Strength, Creep of Concrete & its effect, factors affecting Creep, IS Test Procedure to find Compressive & Tensile Strength of Concrete, Acceptance Criteria, Mean Strength & Standard Deviation Durability of Concrete & factors affecting it Economy of Concrete & factors affecting it, Methods of Non-Destructive Test of Concrete Rebound Hammer Test, Ultrasonic Pulse Velocity Test, Importance of NDT.	9	20
4.	Concrete Mix Design Factors affecting the quality of concrete, Advantages of Quality control, Concrete Mix Design and its importance, Nominal Mix and Design Mix, Factors affecting concrete mix design, Different methods of Mix Design and its suitability, I.S. method to design a Concrete Mix As per IS 10262-2009, Example of Mix design as per I.S. Method.	5	10
5.	Special Concrete & Concrete Cracks Special Concrete: Properties, Advantages and limitations of the following types of Special Concretes Self-Compacting Concrete (SCC), Pervious Concrete, Fiber reinforced concrete, Ready mix concrete, Fly ash concrete, Recycled Aggregate Concrete, High performance Concrete, 3D printed Concrete Modern trends and research in concrete technology, relevant journals and institutes.	7	15
6.	Repair Rehabilitation and Retrofitting of Concrete Structures Differentiate repair, rehabilitation and retrofitting. Apply appropriate repair and rehabilitation techniques for damaged concrete structures. Apply appropriate retrofitting methods to concrete structures	6	15
	Total	45	100

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1.	Properties comparison: The faculty will provide two different company names of cement. Students are required to examine at least three physical properties of each (in two students group) and create a comparison report. Subsequently, they must upload the report onto the GMIU Web Portal.	10
2.	Prepare Chart of Admixture: The faculty will provide the various name of admixture. Student will prepare individually the chart on them with their properties and various utilization. They must upload the photo/PDF on GMIU Web Portal.	10
3.	Innovative Concrete Applications The faculty will assign various types of admixtures to students for creating different types of concrete. Students must test the prepared concrete, compile the results and reports, and upload them to the GMIU Web Portal.	10
Total		30

Suggested Specification table with Marks (Theory): 60

Distribution of Theory Marks						
(Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	60%	20%	-	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Understand the properties and types of cement and aggregates, and their role in concrete production.
CO2	Learn to design concrete mixes considering factors like strength, workability, and durability.
CO3	Evaluate the properties of fresh and hardened concrete, including strength, durability, and impermeability.
CO4	Understand the benefits of admixtures and the importance of water quality in concrete.
CO5	Identify special concrete types and learn techniques for repairing and rehabilitating concrete structures.

List of Practical:

Sr. No	Descriptions	Unit No	Hrs
1.	Determine Fineness (with sieve) and Standard consistency of cement	01	02
2.	Determine Soundness, IST and FST of Cement	01	04
3.	Determine the compressive strength of cement.	01	02
4.	Determine Impact, Crushing and Abrasion value of coarse aggregate	01	02
5.	Determine Flakiness and Elongation index of coarse aggregate	01	02
6.	Determine specific gravity of fine and coarse aggregate	01	02
7.	Measure workability of concrete by slump test and compaction factor test.	02	02
8.	Measure workability of concrete by flow test and Ve-be consistometer test.	02	02
9.	Determine compressive strength of concrete specimen.	03	02
10.	Determine tensile strength of Concrete specimen (cylinder and beam specimen)	03	04
11.	Non-Destructive Test on concrete - Rebound Hammer	03	02
12.	Design concrete mix proportions as per IS: 10262, guidelines	04	04
		Total	30

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Book

- [1] Concrete Technology Theory and Practice, M.S. Shetty, S Chand & Company Ltd. New Delhi
- [2] Concrete Technology Theory and Practice, M. L. Gambhir McGraw Hill Education (I) Pvt. Ltd. New Delhi
- [3] Properties of concrete, A.M. Neville & J.J. Brooks, Pearson Education.
- [4] IS:10262 – 2009, Bureau of Indian Standards

