U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: IV**

Branch: Civil Engineering **Duration: 3 hrs.**

Course Code: 23CV4PCCON / 22CV4PCCON **Max Marks: 100**

Course: CONCRETE TECHNOLOGY

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	Identify Bouge's compounds and explain their role in the setting and hardening of concrete.	*CO* 1	*PO1*	**10**
	b)	Explain the role of chemical admixtures in improving the fresh state behavior of concrete, with a focus on the mechanism of action of superplasticizers on modifying the fresh property of concrete.	*CO* 1	*PO1*	**10**
		OR			
2	a)	Describe the microstructural features of the ITZ (Interfacial transition zone) in concrete and assess the role of SCMs (Supplementary cementitious materials) in modifying its behavior.	*CO* 1	*PO1*	**10**
	b)	Classify different types of aggregates based on their size, shape, specific gravity, and texture.	*CO* 1	*PO1*	**5M**
	c)	Arrive at the fineness modulus for the given sample and identify the type of sand as per specification based on fineness modulus. Note: Weight is given in grams.	*CO* 1	*PO1*	**5M**

BS sieve	Weight retained
4.75 mm	0 g
2.36 mm	15 g
1.18 mm	25 g
600 µm	50 g
300 µm	40 g
150 µm	20 g
Pan	10 g

		UNIT - II			
3	a)	Define workability and factors affecting the workability of concrete.	*CO* 1	*PO1*	**10**
	b)	Differentiate between segregation and bleeding in fresh concrete.	*CO* 1	*PO1*	**5**
	c)	Discuss the different methods of curing.	*CO* 1	*PO1*	**5**

			OR			
	4	a)	Demonstrate the slump test and interpret the different types of slumps observed.	*CO* 1	*PO1*	**6**
		b)	Explain the process of manufacturing of concrete and transporting the concrete to the site.	*CO* 1	*PO1*	**6**
		c)	Elaborate on plastic shrinkage, focusing on its influence on concrete quality and practical approaches to minimize it.	*CO* 1	*PO1*	**8**
			UNIT - III			
	5	a)	Compare between Nominal Mix and Design Mix.	*CO* 2	*PO1*	**5**
		b)	Arrive at the concrete mix design concrete. **STIPULATIONS FOR PROPORTIONING** Grade designation: M40 Type of cement: OPC 43 grade conforming to IS 269 Type of mineral admixture: Fly ash conforming to IS 3812 (Part1) Maximum nominal size of aggregate: 20 mm Exposure condition: Severe (for reinforced concrete) Workability: 125 mm (slump) Method of concrete placing: Pumping Degree of supervision: Good Type of aggregate: Crushed sub angular aggregate Minimum cement content: 320 kg/m^3 Maximum cement content: 450 kg/m^3 Chemical admixture type: Superplasticizer **TEST DATA FOR MATERIALS** Specific gravity of cement: 3.15 Specific gravity of fly ash: 2.20 Specific gravity of 1) Coarse aggregate (at SSD condition): 2.65 2) Fine aggregate (at SSD condition): 2.60 3) Chemical admixture: 1.145 Fine aggregates –Zone III Note: Assume any missing data suitably.	*CO* 2	*PO3*	**15**
			OR			
	6	a)	Discuss the role of environmental exposure conditions in determining the required grade of concrete.	*CO* 2	*PO1*	**5**
		b)	Design a concrete mix for M 30 grade of concrete using IS 10262 – 2019 for the following data. Grade of concrete – M 30 Type of cement- PPC, 43 grade Maximum size of the aggregates – 20 mm Minimum cement content – 320 kg/m^3 Maximum cement content – 450 kg/m^3 Maximum W/C ratio – 0.42 (as per IS 456-2000) Workability – 100 mm slump Exposure condition – Severe Type of aggregates – Angular aggregates Supervision- Good	*CO* 2	*PO3*	**15**

			Material properties: Specific gravity of cement: 3.05 Specific gravity of Coarse aggregate (at SSD condition): 2.70 Specific gravity of Fine aggregate (at SSD condition): 2.65 Specific gravity of Chemical admixture: Super plasticizer – 1.12 Chemical admixture – super plasticizer with 1% optimum dosage. Water absorption – Coarse aggregate -0.5%, Water absorption – Fine aggregate -1% Fine aggregates –Zone II Note: Assume any missing data suitably.			
			UNIT - IV			
	7	a)	Discuss the basic mechanical (hardened) properties of concrete and conducting tests on the same.	*CO* 2	*PO1*	**10**
		b)	Discuss the preparations made before testing the rebound hammer and ultrasonic pulse velocity test and limitations of the tests in assessing the quality of the concrete.	*CO* 2	*PO1*	**10**
			OR			
	8	a)	Differentiate between drying shrinkage and autogenous shrinkage.	*CO* 2	*PO1*	**10**
		b)	Illustrate the nondestructive test evaluation process using the Rebound hammer test.	*CO* 2	*PO1*	**10**
			UNIT - V			
	9	a)	Define durability and explain the factors affecting the durability of concrete.	*CO* 2	*PO1*	**10**
		b)	Explain the mechanism behind the corrosion of steel in the concrete & also the factors causing corrosion.	*CO* 2	*PO1*	**10**
			OR			
	10	a)	Summarize the basic hardened tests conducted to assess the strength of the concrete and also compare their interrelation properties.	*CO* 2	*PO1*	**10**
		b)	Explain the mechanism of sulphate attack in concrete and control measures for the same.	*CO* 2	*PO1*	**10**

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