JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2025

B.Tech- 4th Semester (CE)

COURSE CODE (CREDITS): 23B11CE411(3)

MAX. MARKS: 35

COURSE NAME: Concrete Technology

COURSE INSTRUCTORS: Prof. Ashok Kumar Gupta MAX. TIME: 2 Hours

---

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems.

Q.No	Question	CO	Marks
Q1	It is required to design a M35 grade pumpable concrete mix having a slump of the order of 100-125 mm using G-43 OPC conforming to IS 8112 for a reinforced concrete structure subjected to very severe exposure conditions during its service life. Use IS 10262-2009: Concrete mix proportioning- IS guidelines to estimate preliminary mix proportions since final mix proportions will depend upon actual site conditions which vary with location and other factors. The crushed coarse (angular) aggregates available at the site are of nominal maximum sizes of 10 mm and 20 mm with a specific gravity of 2.67, moisture content of 1.0 per cent, and absorption of 0.5 per cent. Whereas the available fine aggregate has fineness modulus of 2.80 (grading zone-1), specific gravity of 2.62, moisture content of 4.0 per cent, absorption of 1. per cent; the avallable G-43 Portland cement has specific gravity of 3.15. The bulk densities of cement, fine and coarse aggregates are 1450, 1700 and 1800 kg/m^3, respectively. The other stipulations are Standard deviation (from past records) : 2.0 MPa Air content : 4.0 - 5.0 per cent Maximum allowable free water-cement ratio : 0.45 Minimum cement content :340 kg/m3 Maximum cement content (IS 1343-1980) :450 kg/m^3 Chemical admixture type : Superplasticizer conforming to IS 9103 Density of water :1000 kg/m^3	CO-4	7
Q2	Briefly explain the challenges faced by the concrete industry in regard to process improvement and energy efficiency. Enlist different types of cements. Discuss the properties and applications of two OPC based cements (e.g., low heat Portland cement and Sulfate-resisting cement) for concrete construction.	CO-5	5
Q3	Calculate the quantities of ingredients required to produce one cubic	CO-2	6

	meter of structural concrete. The mix is to be used in proportions of one part of cement to 1.37 parts of sand to 2.77 parts of 20 mm nominal size crushed coarse aggregate by dry-volumes with a water-cement ratio of 0.49 (by mass). Assume the bulk densities of cement, sand and coarse aggregate to be 1500, 1700 and 1600 kg/m', respectively. The percentage of entrained air is 2.		
Q4	What is meant by grouting admixture? What are its required properties and how can these properties be improved? Describe segregation, bleeding and laitance of concrete. Explain the factors affecting them.	CO-3	5
Q5	A concrete mixing plant has to supply M15 grade mass concrete in large quantity to a dam project. The mix proportions have been estimated as 1:1.91:4.46 (by mass). This concrete requires sand and gravel (C.A.) mixture of 30 per cent sand and 70 per cent gravel by mass. The natural deposits at five pits near the dam site are found to have different compositions and their cost including transportation to the site also varies as listed in Table . However, the constituents satisfy the specifications. Determine the quantities of deposit to be obtained from each source in order to minimize the cost per cubic meter of concrete.	CO-1	7
Q6	What are the fundamental factors influencing the compressive strength of concrete? Explain any one of them. What is self-compacting concrete, and what are the advantages and disadvantages of using it? Differentiate between volume batching and weigh batching in concrete mix procedure which one is superior.	C0-4	5

Aggregate type	Mixture composition, per cent Pit No.				
	1	2	3	4	5
Sand	45	40	50	55	20
Gravel	55	60	50	45	80
Relative cost per cubic meter of mixture	2.0	3.0	1.5	1.0	2.5