

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS- 2026

B.Tech-IV Semester (CE)

COURSE CODE (CREDITS): 25B11CE413 (3)

MAX MARKS: 35

COURSE NAME: CIVIL ENGINEERING MATERIALS

COURSE INSTRUCTOR: Akash Bhardwaj

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**(c) Use of calculator is allowed*

Q.No	Question	CO	Marks
Q1	Design a concrete mix for M25 grade concrete as per IS 10262 and IS 456 using the following data: - Exposure condition: Moderate and RCC - Type of cement = O.P.C- 43 grade - Maximum nominal aggregate size: 20 mm - Fine aggregate: Zone II - Specific gravity of cement = 3.15 - Specific gravity of coarse aggregate (20 mm) = 2.68 - Specific gravity of fine aggregate = 2.65 Assume suitable values wherever necessary.	CO 2	8
Q2	Design a mix for M35 grade pumped concrete as per IS code with: - Exposure condition: Severe and RCC - Type of cement = O.P.C- 43 grade - Maximum aggregate size: 20 mm - Fine aggregate: Zone II - Specific gravity of cement = 3.12 - Specific gravity of CA (20 mm) = 2.72 - Specific gravity of FA = 2.64 Assume suitable values wherever necessary.	CO 2	8
Q3	(a) Enlist any three defects in painting and explain them. (b) Write the classification of paints based on binder.	CO 3	3+2
Q4	(a) Classify and explain aggregates based on: - Size - Specific Gravity	CO 2	4+3

	(b) Why is sieve analysis important in aggregate testing? Explain with an example.		
Q5	(a) Explain about different methods of transportation of concrete for: • Small construction sites • High-rise buildings • Mass concreting works (b) For Calcium Oxide (CaO): 65%, Silicon Dioxide (SiO₂): 22%, Aluminum Oxide (Al₂O₃): 5%, Iron Oxide (Fe₂O₃): 3% and Sulfur Trioxide (SO₃): 2%. Calculate C₂S and C₃A using Bogue's equations.	CO 2	3+4

Supporting Tables for Mix Design Question

Table 1: Standard Deviation as per IS 10262

Grade of Concrete	Assumed Standard Deviation (σ) (MPa)
M10, M15	3.5
M20	4.0
M25	4.0
M30 & above	5.0

Table 2: Maximum Water-Cement Ratio & Minimum Cement Content for Durability (IS 456:2000)

Exposure Condition	Max. w/c Ratio (RCC)	Min. Cement (kg/m ³) (RCC)
Mild (e.g., indoor)	0.55	300
Moderate (e.g., rain, freezing)	0.50	300

Exposure Condition	Max. w/c Ratio (RCC)	Min. Cement (kg/m ³) (RCC)
Severe (e.g., marine, sulphate)	0.45	320
Extreme (e.g., coastal)	0.40	340

Table 3: Approximate Water Content (kg/m³) for Different Slumps (IS 10262)

Max. Aggregate Size (mm)	Maximum Water Content (kg/m ³)
10	208
20	189
40	165

Table 4: Volume of Coarse Aggregate per Unit Volume of Concrete (IS 10262)

Max. Aggregate Size (mm)	Zone II
10	0.46
20	0.62
40	0.71