

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS- 2026

B.Tech-VIII Semester (CSE/IT/BT/ECE/CE)

COURSE CODE (CREDITS): 18B1WCE831 (3)

MAX MARKS: 35

COURSE NAME: ADVANCED REINFORCED CONCRETE DESIGN

COURSE INSTRUCTOR: Dr. KAUSHAL KUMAR

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, IS codes are allowed.

Q.No	Question	CO	Marks
Q1	Determine the permissible service load for a simply supported square slab of size 4 m x 4 m. It is reinforced with 10 mm diameter bars @200 mm c/c in both directions. The total depth of slab is 150 mm.		4
Q2	Design a rectangular underground tank of dimension 10m x 4 m x 4 m with following data: - Density of Soil = 16 kN/m³ - Angle of repose = 30° - Live load on top of slab = 3 kN/m² Use M25 concrete and Fe 415 steel. There are chances of rise in water table.		9
Q3	(a). What is Shear Key? How is it designed? (b). Design a counterfort retaining wall with following data: (i) Height of wall above ground = 7.5 m (ii) Depth of foundation = 1.5 m (iii) Safe bearing capacity of soil = 180 kN/m² (iv) Angle of internal friction for backfill = 30° (v) Unit weight of earth = 18 kN/m³ (vi) Spacing of counterforts = 2.5 m (vii) Coefficient of friction between soil and concrete = 0.5 Use M20 concrete and Fe 415 steel.		3 + 6

Q4	A circular reinforced concrete silo has an internal diameter of 4 m and stores grain up to a height of 10 m. The unit weight of grain is 8 kN/m³. Assume, as per Bureau of Indian Standards IS 4995: • Coefficient of wall friction, $\mu = 0.4$ • Ratio of horizontal pressure to vertical pressure, $K = 0.35$ Using Janssen's theory, calculate: - Hydraulic mean radius of silo - Vertical pressure at the bottom - Horizontal pressure at the bottom - Hoop tension in the wall at the bottom section		6
Q5	(a). Write short notes on rectangular combined footing and trapezoidal combined footing. (b). Design a combined footing for two columns 500 mm x 500 mm each, each 5 m apart carrying 1600 kN load. Available width restriction is 2.4 m. The safe bearing capacity is 200 kN/m². <i>Use M20 concrete and Fe 415 steel.</i>		2+5