

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS-2022

B.Tech. - VIII Semester (Civil Engineering)

COURSE CODE: 18B1WCE831

MAX. MARKS: 25

COURSE NAME: Advanced Reinforced Concrete Design

COURSE CREDITS: 3

MAX. TIME: 1 Hour 30 Min

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q1. What is the effective length of the column in each of the following cases: [4 × 1.25 = 5]

- i. Unsupported Length: 2m; Both ends hinged
- ii. Unsupported Length: 3m; Both ends fixed
- iii. Unsupported Length: 3.5m; One end hinged other end fixed
- iv. Unsupported Length: 2.5m; One end fixed and other free

Q2. For the beam cross-section shown in Figure 1 below, determine the moment of resistance:

- i. $\sigma_{ck} = 20 \text{ N/mm}^2$; $\sigma_y = 415 \text{ N/mm}^2$ [2.5 Marks]
- ii. $\sigma_{ck} = 20 \text{ N/mm}^2$; $\sigma_y = 500 \text{ N/mm}^2$ [2.5 Marks]

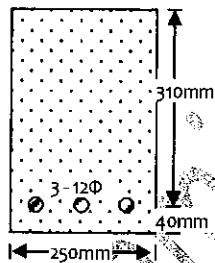


Figure 1

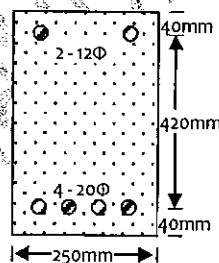


Figure 2

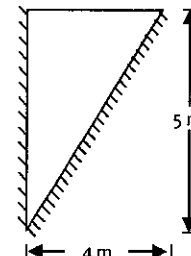


Figure 3

Q3. For a 25 cm wide and 50 cm deep rectangular doubly reinforced beam having 2 - 12 mm dia bars as compression reinforcement and 4 - 20 mm dia bars as tension reinforcement with an effective cover of 40 mm on both sides (Figure 2), determine the moment of resistance. Use M20 Concrete and Fe 415 Steel. [8 Marks]

Q4. Enlist the assumptions for Yield Line Theory for analysis of slabs [2 Marks]

Q5. A triangular slab shown in Figure 3 is simply supported along the two edges and free about the third edge. The ultimate moment capacities along the horizontal and vertical directions are 50 kNm/m and 30 kNm/m. Determine the yield line pattern and the uniformly distributed collapse load using Virtual Work Method. [5 Marks]