

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS- 2022

M.Tech- II Semester (Civil)

COURSE CODE (CREDITS): 12M1WCE231 (3)

MAX. MARKS: 25

COURSE NAME: PRESTRESSED CONCRETE DESIGN

COURSE INSTRUCTORS: DR. SAURAV

MAX. TIME: 1 Hour 30 Min

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

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**Q1.** A concrete beam AB of span 12m is post tensioned by a cable which is concentric at supports A and B and has an eccentricity of 200mm in the mid third span with a linear variation towards the supports. If the cable is tensioned at the jacking end A, what should be the jacking stress in the wires if the stress at B is to be  $1000 \text{ N/mm}^2$ ? Given  $\mu=0.55$  and  $k=0.0015/\text{m}$ . [4]

**Q2.** A concrete beam is post tensioned by a cable carrying an initial stress of  $100 \text{ N/mm}^2$ . The slip at the jacking end was observed to be 5mm. Estimate the percentage loss of stress due to anchorage slip if the length of the beam is a) 30m and b) 3m. [3]

**Q3.** A prestressed concrete beam of rectangular section 120mm wide and 300mm deep is prestressed by 6 wires of 6mm diameter, provided at an eccentricity of 55mm. The initial stress in the wires is  $1150 \text{ N/mm}^2$ . Find the loss of stress in steel due to creep of concrete.  $E_c=30000 \text{ N/mm}^2$  and  $E_s=200000 \text{ N/mm}^2$ ,  $\phi=1.5$  [4]

**Q4.** A rectangular concrete beam 250mm  $\times$  300mm is prestressed by a force of 540kN at a constant eccentricity of 60mm. The beam supports a point load of 68kN at the center of the span of 3m. Determine the location of pressure line at the center, quarter span and support sections of the beam. Ignore self weight of the beam. Also draw the pressure line diagram. [4]

PTO

**Q5.** A prestressed concrete rectangular beam 250mm × 600mm is simply supported on a span of 8m. At the mid section of the beam the cable is provided at a height of 200mm from the soffit. The initial prestressing force is 1000kN which after losses decreases to 830kN. Determine the uniformly distributed load the beam will carry at the final stage for the following cases [6]

i) The stress at the bottom edge is zero

ii) The stress at the bottom edge reaches a cracking tensile stress of 4 N/mm<sup>2</sup>

**Q6.** Write short notes on **any two** of the followings [4]

i) Loss of prestress due to elastic shortening in post tensioned members

ii) Loss of prestress due to friction

iii) Advantages of using prestressed concrete over RCC