

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS- 2022

B.Tech- 8th Semester (Civil)

COURSE CODE: 21B1WCE831

MAX. MARKS: 25

COURSE NAME: Design of Prestressed concrete Structures

COURSE CREDITS: 03

MAX. TIME: 1 Hour 30 Min

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

Q1. A prestressed concrete beam 400mm×600mm in section has a span of 6m and is subjected to udl of 16kN/m including the self weight of the beam. The prestressing tendons which are located along the longitudinal centroidal axis provide an effective prestressing force of 960kN. Determine the extreme stresses in concrete for mid span section using strength concept. Also draw the resultant stress diagram. [5]

Q2. A rectangular beam of width B and total depth D is prestressed with tendons passing from the center of the beam. For a no tension design where σ_c is the permissible stress in concrete, Find the total moment carrying capacity of the beam in terms of σ_c ? [3]

Q3. A Prestressed concrete beam of rectangular section is 125mm wide and 300mm deep. The beam is prestressed with a cable provide along the longitudinal centroidal axis. The effective prestressing force is 180kN. The beam carries a UDL of 2.25kN/m including the weight of the beam. Locate the pressure line for the beam at every 1m from each end. The span of the beam is 8m. [5]

Q4. Derive an equation to find the Loss of prestress due to friction in a post tensioned member. On what factors wobble in the tendon is effected? [5]

Q5. Write short answer on any two of the followings [4]

- i) Externally prestressing and internally prestressing
- ii) Ideal stress diagram at service condition
- iii) Use of high tension wires in prestressing

Q6. A concrete beam of 10m span , 100mm wide and 300mm deep is prestressed by a cable with cross sectional area 200mm². The cable profile is parabolic with an eccentricity of 50mm above centroidal axis at supports and 50mm below at mid span. If the cable is tensioned from one end only estimate the percentage loss of prestress in the cable due to friction only. Given $\mu= 0.3$ and $k= 0.0015/m$ [3]