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Question Paper Code: 59123

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Elective

Civil Engineering

15UCE923- PRESTRESSED CONCRETE STRUCTURES

(Regulation 2015)

Duration: 1.15 hrs

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. The deflection of a pretensioned beam is influenced by CO1- R
(a) Tendon profile (b) Anchorage slip (c) Self weight (d) Imposed load
2. Prestressing is possible by using CO1- R
(a) Mild steel (b) High-strength deformed bars
(c) High-tensile steel (d) None of the above
3. In partially prestressed members to which extent tensile stresses are permissible _____ CO2- R
(a) Unlimited (b) Limited (c) Constant (d) Zero
4. The moment of resistance of a rectangular section depends upon CO2- R
(a) Ultimate strain in concrete (b) Area of high tension tendons
(c) Tension stress in concrete (d) None of the above
5. Prestressed concrete tanks are generally cylindrical with diameters upto CO3- R
(a) 200 m (b) 100 m (c) 300 m (d) 400 m
6. The classification of concrete pipes may be done depending upon the method of CO3- R
(a) Curing (b) Placement (c) Manufacturing (d) Tension
7. The most common type of composite construction is _____ CO4- R
(a) I beams (b) T beams (c) L beams (d) V beams

8. Composite construction is economical since the ratio of size of precast unit to that of the whole composite member is CO4- R
- (a) Increased (b) Reduced (c) Constant (d) None of the above
9. The prestressed concrete bridge decks generally comprise _____ CO5- R
- (a) Precast pretensioned (b) Precast postensioned
- (c) Partially pretensioned (d) Partially postensioned
10. For bridge decks of short span ranging from 15 to 25 m it is economical to use CO5- R
- (a) Reinforced concrete tee beam and slab (b) Steel girder and cast in situ slab
- (c) Prestressed concrete cored slab (d) None of the above

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. A pretensioned beam 200 mm wide and 300 mm deep is prestressed by 10 wires of 7 mm diameter initially stressed to 1200 N/mm^2 with their centroids located 100 mm from the soffit. Find the maximum stress in concrete immediately after transfer allowing only for elastic shortening. If the concrete undergoes further shortening due to creep and shrinkage while there is a relaxation of 5% of steel stress, estimate the final % loss of stress in wires using the following data: $E_s = 210 \text{ KN/mm}^2$. $E_c = 5700\sqrt{f_{ck}}$; $f_{ck} = 42 \text{ N/mm}^2$; creep coefficient = 1.6; total residual shrinkage strain = 3×10^{-4} . CO1- App (8)
12. A pretensioned prestressed concrete beam having a rectangular section 150 mm wide and 350 mm deep has an effective cover of 50 mm. If $f_{ck} = 40 \text{ N/mm}^2$, $f_p = 1600 \text{ N/mm}^2$ and the area of prestressed steel $A_p = 461 \text{ mm}^2$, Calculate the ultimate flexural strength of section using IS 1343 provisions. CO2- App (8)
13. A cylindrical PSC water tank of internal diameter 30m is required to store water over a depth of 7.5m. The permissible compressive stress in concrete at transfer is 13 N/mm^2 . The minimum compressive stress under working pressure is 1 N/mm^2 . The loss ratio is 0.75. Wires of 5mm diameter with an initial stress of 1000 N/mm^2 are available for circumferential winding and Freyssinet cables made up of 12 wires of 8mm diameter stressed to 1200 N/mm^2 are to be used for vertical prestressing. Design the tank walls assuming the base as fixed. The CO3- App (8)

cube strength of concrete is 40 N/mm^2 .

14. Explain the advantage of using precast prestressed element along with insitu concrete. CO4- Ana (8)
- 15 With figures explain the construction sequence and tendons profiles of segmental prestressed concrete balanced cantilever bridges. CO5- U (8)