## 23392

## M. Tech. 1st Semester (Civil Engg.) (Specialisation in Structural Design) Examination – January, 2023

### PRE STRESSED CONCRETE DESIGN

Paper : MTSD-103

Time : Three Hours ]                    [ Maximum Marks : 100

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

**Note :** Attempt *five* questions in all, selecting *one* question from each Section. Question No. 1 is *compulsory*. All question carrying equal marks.

1. Describe the following :                    20
   (a) Creep of concrete
   (b) Shrinkage of concrete
   (c) Code provision for prestressed concrete

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(b) Write the method of computing the ultimate flexural and shear strength of composite sections.                    10

## SECTION – D

8. Explain the following :                    20
   (a) Web shear, flexure
   (b) Flexure shear cracks in concrete beam

9. The horizontal pressure at the centeriod of a concrete beam of rectangular cross-section, 150 mm by 350mm is 8 N/mm² and the maximum shearing force on the beam is 100 KN. Calculate the maximum principal tensile stress. What is the minimum vertical pre stress required to eliminate the principal tensile stress ?                    20

(d) High tensile steel

(e) Stress-strain relationship

## SECTION – A

2. (a) State advantages and disadvantages of pre stressed concrete member over reinforced concrete members. 10

(b) A concrete beam supports three concentrated load equally spaced on simply supported span. Suggest a suitable cable profile to counteract the effect of these live loads. 10

3. (a) Briefly explain equivalent loads in prestressed concrete beam with sketches. 10

(b) What is effective reinforcement ratio ? In what way will it influence the stress in tendons and the neutral axis depth at the limit state of collapse of prestressed concrete sections ? 10

## SECTION – B

4. (a) What is the necessity of using high strength concrete and high tensile steel in prestressed concrete ?

(b) Write a brief note on the various materials for pre stressed concrete. 10

5. (a) Explain the relation between tendon profiles and relaxation of stress in steel. 10

(b) A concrete beam of rectangular cross section 300 mm by 600 mm deep supports an uniformly distributed load of 20 KN/m in addition to its self weight. Suggest a suitable cable profile and the pre stressing force having an eccentricity of 150mm. at the centre of the span to support the dead load and live load. 10

## SECTION – C

6. (a) What is the effect of the torsion on pre stressed concrete section ? 10

(b) How do you compute the shear stress developed in different type of cross section due to torque ? 10

7. (a) What are the advantages of using composite construction with prestressed and insitu concrete in structural members ? 10