[Total No. of Printed Pages:1] **CODE NO:- U-397**

FACULTY OF ENGINEERING AND TECHNOLOGY

B.E.(Civil) Examination - DEC – 2014

Elective-I: Prestressed Concrete (Revised)

[Time: THREE *Hours*] **[Max. Marks: 80]**

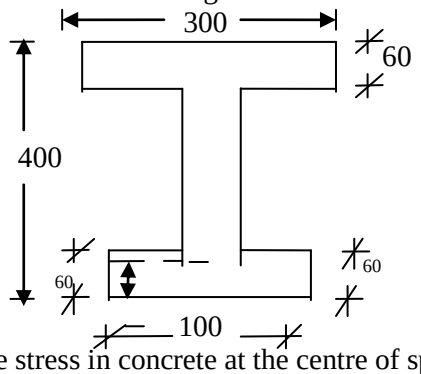
"Please check whether you have got the right question paper."

N.B
1) Solve any three questions from section A & B each.
2) Use of IS 1343,456 is allowed.
3) Assume suitable data & state it clearly.

SECTION A

Q.1 A simply supported post –tensioned beam of span 15m has a rectangular cross-section$300 \times 800mm$. The prestress at ends is 1300KN with zero eccentricity at the supports and an eccentricity of 250mm at the centre, the cable profile being parabolic. Assuming K = 0.15 per 100m, and $\mu = 0.35$, determine the loss of stress due to friction at the centre of the beam. 13

Q.2 An unsymmetrical I-section concrete beam shown in fig.1 is used to support a live load of 2KN/m over a span of 8m. The effective. Prestressing force is 100KN located 50mm from the soffit of the beam 13



a) Compute the stress in concrete at the centre of span soffit of the beam under working loads.
b) If the modulus of rupture of concrete is 5 Mpa, determine the load factor against cracking.

Q.3 A prestressed concrete beam 250mm wide and 650mm deep is subjected to an effective prestressing force of 1360KN along the longitudinal centroidal axis. The cables may be assumed to be symmetrically placed over mild steel anchor plate in an area$150mm \times 350mm$. Design the end block using IS code method. 13

Q.4 A double T-section having a flange 1200mm wide and 150mm thick is prestressed by 4700mm^2 of high tensile steel located at an eff. Depth of 1600mm. the ribs of 150mm thick. if the compressive strength of concrete is $40N/mm^2$ & tensile strength of steel is 1600MPa determine the flexural strength of the double tee girder using IS 1343 provisions. 13

Q.5 a) Explain magnel's & guyon's method for design of end block. 14
b) Explain the concept of cable profiles, thrust line and pressure line.

SECTION B

Q.6 The support section of a prestressed concrete beam, 120mm wide and 250mm deep, is required to support an ultimate shear force of 60KN. The compressive prestress at the centroidal axis is 5 MPa. 13
Fck=40 MPa; cover = 50mm, Fy = 250 MPa of stirrups,
Using IS 1343, design suitable reinforcement at the section.

Q.7 A post tensioned prestressed concrete beam of rectangular section 400mm wide by 1000mm deep spans over 15m and supports a live load of 25KN/m. if fct=17MPa ftt=ftw=0, $\eta = 0.85$, design the prestressing force and eccestricity. 13

Q.8 The floor slab of an industrial structure spanning over 8m is to be designed as a one way slab with parallel post tensioned cables L.L=10KN/m^2 fck=14MPa & ftt=ftw=0. Design a suitable thickness for the slab and estimate the max. Horizontal spacing of the Freyssinet cables (12 of 5mm dia. Initially stressed to 1200 Mpa) and their position at mid span section. The loss ratio is 0.8. 13

Q .9 A pre –tensioned prestressed concrete pole is to be designed to suit the following data. 13
Height of pole above ground = 10m wind force acting on wires at a height of 8m from base = 2KN wind force on pole = 1.6 KN , fcw = 16 MPa, no tension is permitted. Loss ratio = 0.8, high tensile wires are available of 8mm dia. & initially stressed to 1200 MPa. For use. Design a suitable section & number of wires required for pole.

Q.10 a) Explain the methods of design of pipe 14
b) Explain stepwise procedure for the analysis of composite section.