Code No: **R1642013** **R16** **Set No. 1**

IV B.Tech II Semester Advanced Supplementary Examinations, Aug/Sep – 2022

PRESTRESSED CONCRETE

(Civil Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B
*****

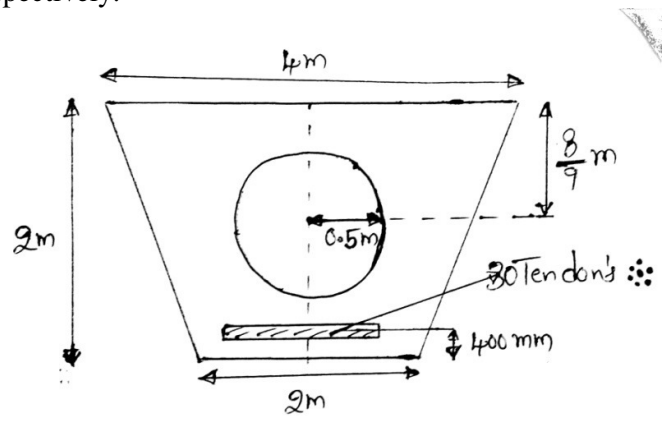
PART–A *(14 Marks)*

1. a) What is relaxation of stress? [3]
   b) Write difference between PCC, RCC and PSC? [3]
   c) What is difference between pre-tensioned and post tensioned member? [2]
   d) What are the assumptions for flexural design? [2]
   e) If a PSC Girder designed without shear reinforcement, then, what are future consequences? [2]
   f) What is bond Stress? [2]

PART–B *(4x14 = 56 Marks)*

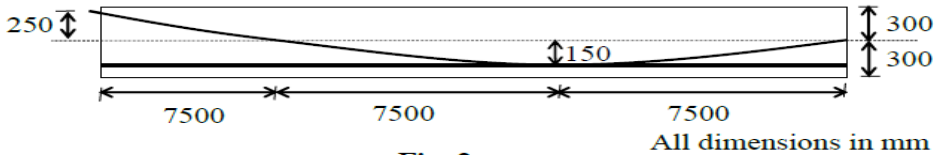
2. a) Write advantages and applications of Prestressed Concretes. [7]
   b) Write about Permissible Stresses- Relaxation of Stress, Cover Requirements of steel wires. [7]

3. Find out resultant stresses in concrete at the center of the span and support of a simply supported prestressed concrete bridge girder as shown in below (Span is 35 m)? Inside of girder it is having rigid cylindrical pressure vessel of 1m diameter, 35 m length with gas pressure 10 kg/cm^2 and it imparts hoop stress as 100 MPa and longitudinal stress 50 MPa (assume thickness cylinder is negligible). Use grade M 45, total 30 tendons and each tendon having 7 numbers of 7 mm wires and all are prestressed at 2000 MPa capacity. Superimposed load on the girder is 40 kN/m and density of gas and concrete is 2 kg/m^3, 25 kN/m^3 respectively.



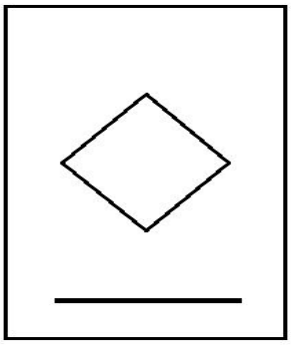
[14]

4. A post-tensioned concrete beam of square cross section is shown in figure. It is prestressed with a straight cable A of constant eccentricity of 150 mm and a parabolic cable B as shown below. Cable A is made of 20 wires of 28.2 mm^2 and cable B consists of 15 wires of 50.2 mm^2 each wire. Cable B is tensioned after cable A. Both cables are stressed to 1500 MPa. Calculate the loss of stress due to elastic shortening for
Case I. Cable B is tensioned after cable A
Case II. Cable A is tensioned after cable B. Take modular ratio as 6.



[14]

5. A Pre-tensioned concrete girder with 550mm X 850 mm cross-section as shown below. It has hallowed square section with diagonal 400 mm located at C.G of girder. It is prestressed with tendons of area 2000 mm^2 with effective prestress of 1600 MPa and grade of concrete is M40. Estimate the flexural strength of the member as per IS:1343 -2012. Take effective cover as 100 mm



[14]

6. A prestressed uncracked rectangular girder of 200 mm X 350 mm with square hallow portion of 150 mm X 150 mm is to be designed to support dead load of 20kN/m, live load of 25 kN/m, wind load of 10 kN/m and seismic load of 20 kN/m. Length of the beam can be taken as 4m. The uniform prestress across the section is 5 MPa. Take M40 and Fe415 bars of 10 mm diameter, use effective cover as 40mm. Design this beam for shear and torsion per IS 1343. [14]

7. A post tensioned PSC beam 350mm X 650mm is provided with 2 cables of 50mm diameter each containing 15 wires of 6 mm diameter. The effective cover of cable is 100 mm. The beam spans of 12 m and supports live load of 55kN/m. If the cables are grouted before application of live loads calculate the unit bond stress
   a. Between each wire and grout
   b. Between cable hose and concrete [14]