Roll No. | | | | | | | | | | | | | Total No. of Pages : 04

Total No. of Questions : 08

M.Tech Structural Design (2016 & Onwards) (Sem.-1)

ADVANCED STRUCTURAL ANALYSIS

Subject Code : MTSD-102

Paper ID : [74243]

Time : 3 Hrs. Max. Marks : 100

INSTRUCTION TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.
3. Missing data may be assumed suitable.

Q1 Support C of the continuous beam shown in Figure (1) has a downward settlement of 3 cm. Calculate the support reactions at D by the force method. (20)

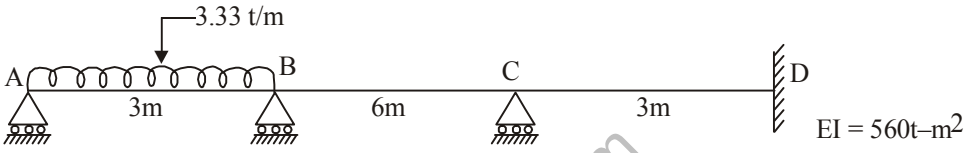

Fig. 1

Q2 Analyse the portal frame shown in Figure (2) by displacement method and also draw the B.M.D and S.F.D. (20)

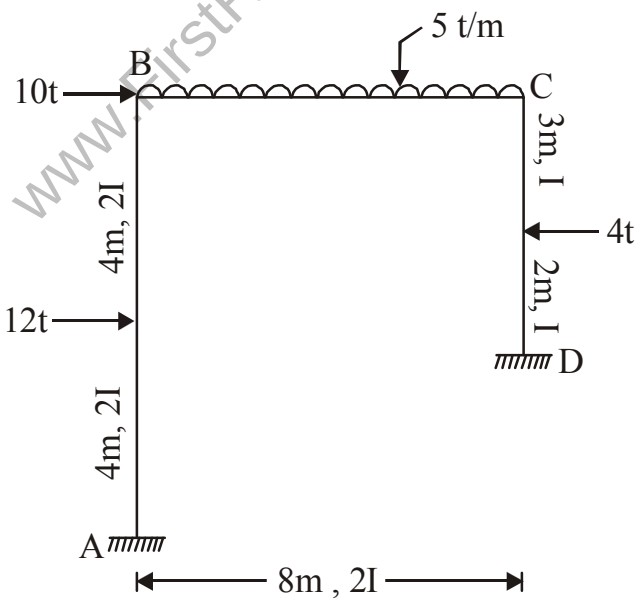

Fig. 2

Q3 Analyse the pin jointed plane frame shown in Figure (3) by stiffness approach. The axial stiffness for each member is 45 t/cm.

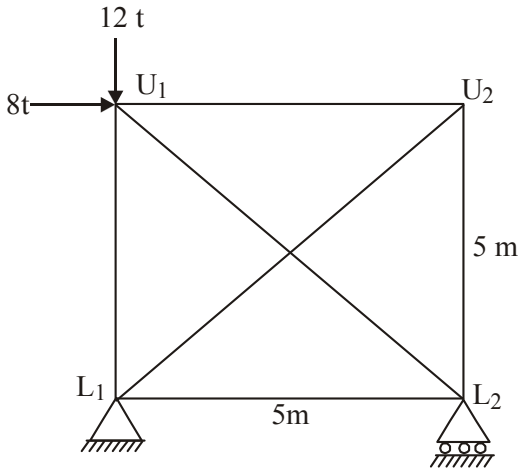

Fig. 3

Q4 a) Discuss why the released structure which minimizes the magnitudes of the redundant generally leads to maximum accuracy. (5)

b) Discuss the element approach and its suitability for the automatic analysis of structures by a digital computer. (5)

c) Analyse the frame shown in Figure (4) by force method. Hence determine the force in member AE. The axial flexibility, L/AE is same for all the-members. (5)

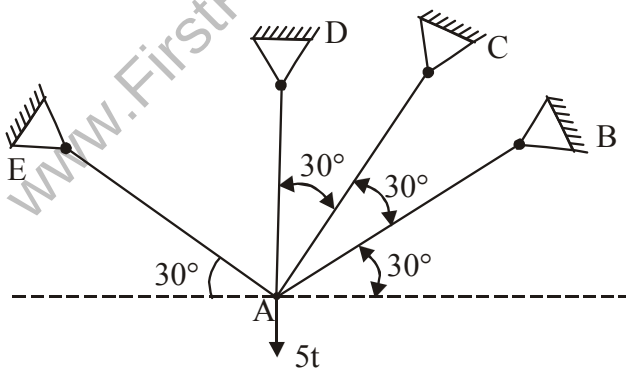

Fig. 4

Q5 a) What is a dome? Explain with sketch the Meridinal and Hoop stresses developed in domes. (5)

b) Drive expressions for circumferential and meridinal stress resultants for a hemispherical dome under surface loads. (15)

Q6 a) Determine the shape factor of I- section shown in Figure (5). All linear dimensions shown are in mm. (10)

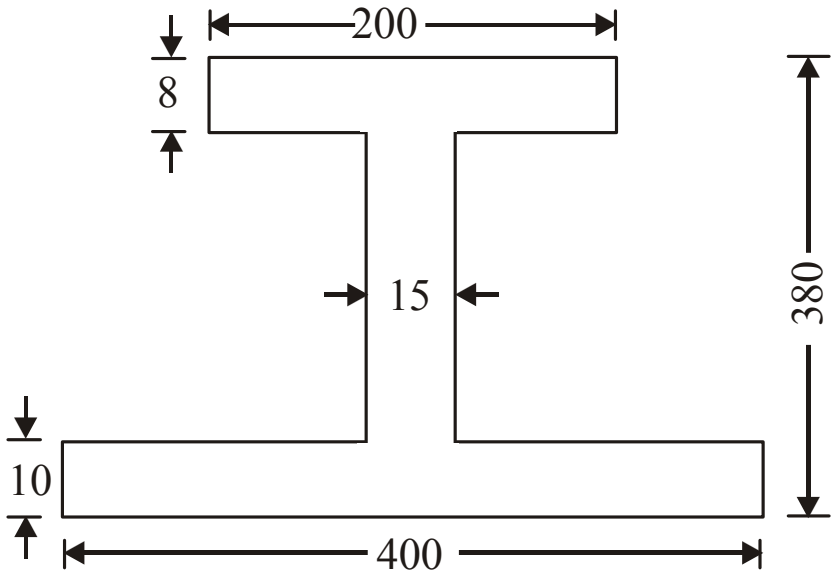

Fig. 5

b) Determine the plastic moment capacity M_p required for the continuous beam shown in Figure (6) by assuming the same section is used throughout. (10)

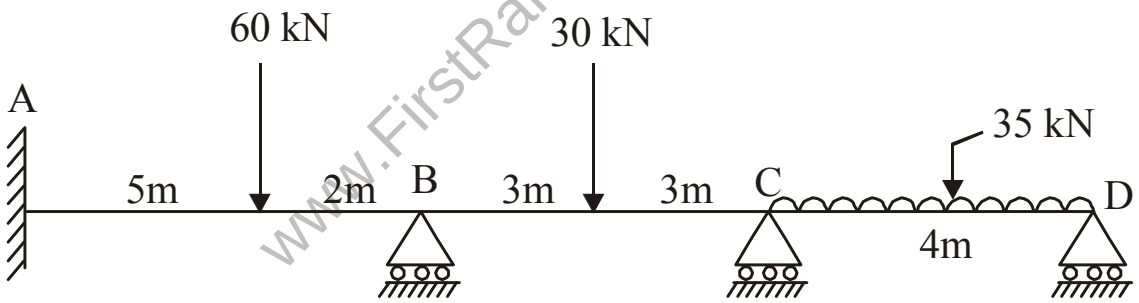

Fig. 6

Q7 Find the value of W at collapse for the portal frame shown in Figure (7). The plastic moments of the members of the frame are shown in the Figure. (20)

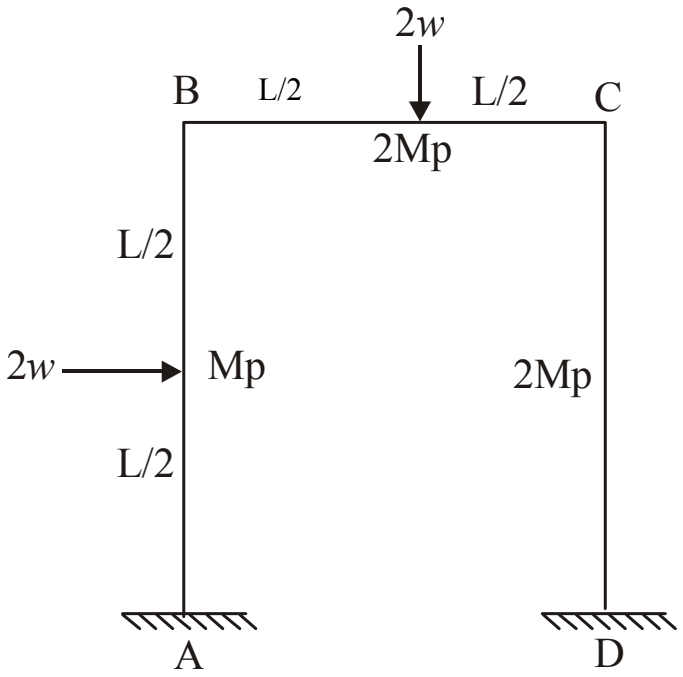

Fig. 7

Q8 a) Design a conical dome roof for a room with base diameter as 14 m. The live load due to wind, snow, etc., may be taken as 1200 N/m^2. The height of the roof is 4.5m. Use M20 concrete and Fe 415 steel reinforcement. (15)

b) Determine the degree of static and kinematic indeterminacies of the frame shown in Figure (8). (5)

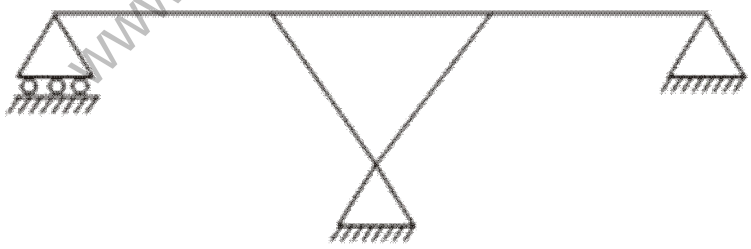

Fig. 8