(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2133 Roll No.

B.Tech.

(SEM. V) ODD SEMESTER THEORY EXAMINATION 2013-14

STRUCTURAL ANALYSIS–II

Time : 3 Hours *Total Marks : 100*

Note :– (1) Attempt **all** the questions.

(2) Each question carries equal marks.

(3) Assume any missing data suitably.

1. Attempt any **two** parts : **(10×2=20)**

(a) A beam ABC of length 2L rests on the three supports equally spaced and is loaded with u.d. ℓ, 'w'/unit length through out the length of the beam as shown in Fig. 1. Plot the B.M. and shearforce diagrams.

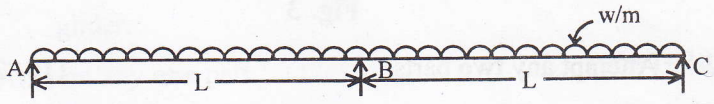

Fig. 1

(b) A beam ABC, 10 m long, fixed at ends A and C is continuous over joint B and is loaded as shown in Fig. 2. Using the slope deflection method, compute the end moments and plot the bending moment diagram. Also sketch the deflected

slope of the beam. EI is constant for both the spans.

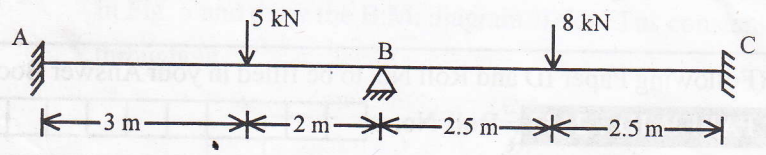

Fig. 2

(c) Calculate the distributed moments for the members OA, OB, OC and OD as shown in Fig. 3. If their lengths are 150, 200, 100 and 200 cm and moment of inertia are 300, 400, 300 and 200 cm^4 unit respectively. The applied moment at joint 'O' is 10800 N-cm.

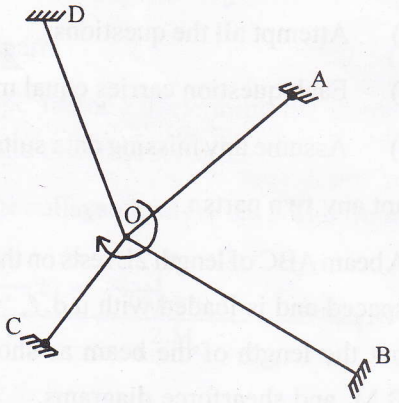

Fig. 3

2. Attempt any **two** parts : **(10×2=20)**

(a) Explain the Muller-Breslan principle. Draw the influence line for prop reaction in a propped cantilever.

(b) A parabolic two hinged arch has a span of 32 meters and a rise of 8 m. A uniformly distributed load of 1 kN/m covers 8.0 m horizontal length of the left side of the arch. If $I = I_0 \sec\theta$, where θ is the inclination of the arch of the

section to the horizontal, and I_0 is the moment of inertia of the section at the crown, find out the horizontal thrust at hinges and bending moment at 8.0 m from the left hinge.

(c) A two hinged parabolic arch has a span of 30 m and a central rise of 5.0 m. Calculate the maximum positive and negative bending moment at a section distant 10 m from the left support, due to a single point load of 10 kN rolling from left to right.

3. Attempt any **two** parts : **(10×2=20)**

(a) A cable is used to support five equal and equidistant loads over a span of 30 m. Find the length of the cable required and its sectional area if safe tensile stress is 140 N/mm^2. The central dip of the cable is 2.5 m and loads are 5 kN each.

(b) The three hinged stiffening girder of a suspension bridge of 100 m span is subjected to two point loads of 10 kN each placed at 20 m and 40 m respectively from the left hand hinge. Determine the B.M. and S.F. in the girder at section 30 m from each end.

(c) Draw the influence line diagram for horizontal pull, shear force at any section and B.M. in three hinged stiffening girder.

4. Attempt any **one** part : **(20×1=20)**

(a) Using the force method, determine the reactions and moments over supported of a continuous beam shown in Fig. 4.

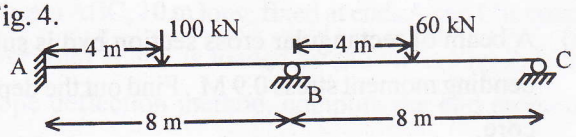

Fig. 4

(b) Using the displacement method, analyse the frame shown in Fig. 5 and draw the B.M. diagram. Take EI as constant throughout.

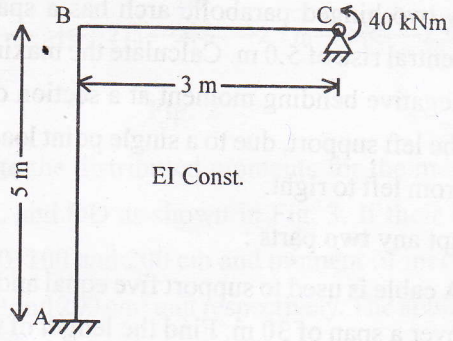

Fig. 5

5. Attempt any **two** parts : **(10×2=20)**

(a) What is shape factor ? Determine the shape factor for rectangular and diamond section.

(b) Determine the collapse load for the portal frame shown in Fig. 6.

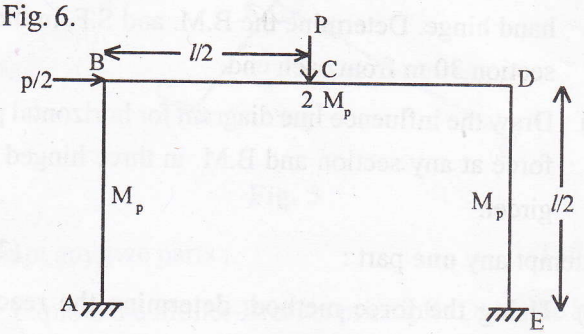

Fig. 6

(c) A beam of rectangular cross section bxd is subjected to a bending moment stress 0.9 M_p. Find out the depth of elastic core.