Reg. No.											

INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

IV SEMESTER B.S. DEGREE EXAMINATION – NOV. / DEC.2016

SUBJECT: STRUCTURAL ANALYSIS (CE 242)

(BRANCH: CIVIL)

Thursday, 24 November 2016

Time: 3 Hours **Max. Marks: 100**

- ✓ **Answer ANY FIVE FULL Questions.**
- ✓ **Missing data if any may be assumed suitably and indicated.**

1A. For the beam loaded as shown in Fig. Q. No. 1A, obtain the slope at the end A and deflection at C using moment area method. Take E = 200 GPa, I = 5 X 10^8 mm^4. **(15 marks)**

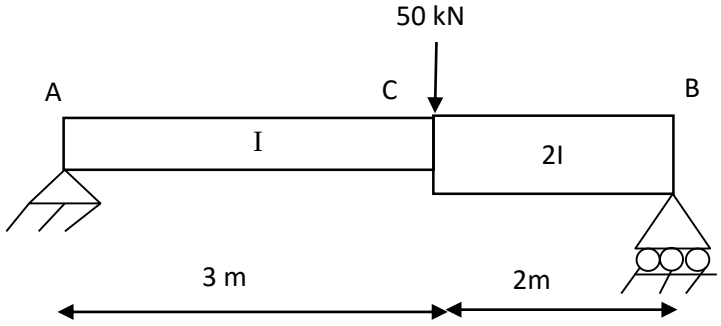

Fig. Q. No. 1A.

1B. Explain Conjugate beam method for determining slope and deflection in beams. **(5 marks)**

2. Find the horizontal movement of the roller end D of the portal frame shown in Fig. Q. No. 2. using Castigliano's method. Take E = 200 GPa, I = 3 X 10^8 mm^4. **(20 marks)**

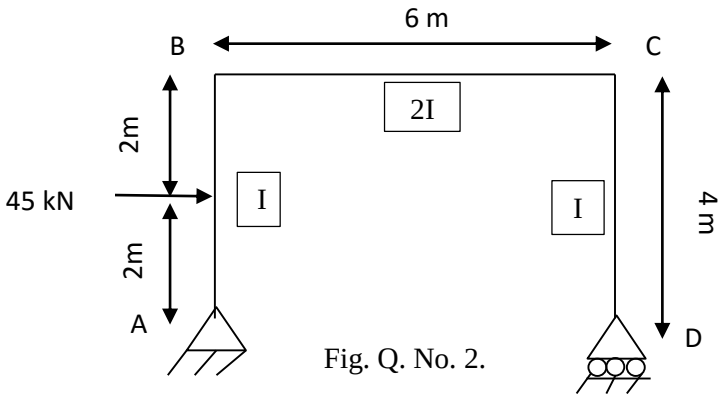

Fig. Q. No. 2.

3A. Define Betti's law. Using strain energy method, determine the deflection at the free end of a cantilever of length 'L' subjected to a concentrated load 'P' at the free end. **(8 marks)**

3B. Find the support reaction of the portal frame shown in Fig. Q. No. 3B. by Castigliano's method. **(12 marks)**

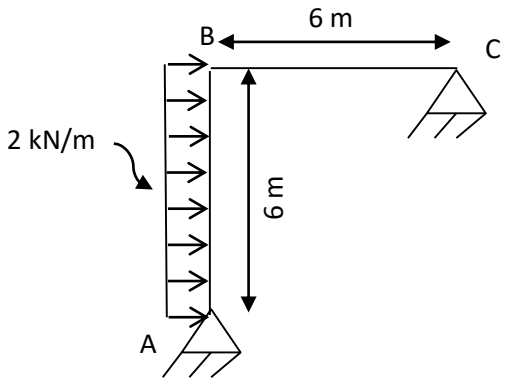

Fig. Q. No. 3B.

4 A three hinged arch has a span of 30 m and rise of 10 m. The arch carries a uniformly distributed load of 60 kN per meter on the left half of its span. It also carries two concentrated loads of 160 kN and 100 kN at 5 m and 10 m from the right end. Determine:

a) Reactions at the support.

b) Bending moment under the concentrated loads and maximum bending moment in span AC.

c) Normal thrust and radial shear at a distance of 10 m from the left support.

d) Draw BMD. **(20 marks)**

5. Find the vertical deflection of the joint G of the truss shown in Fig. Q. No. 5. The sectional areas of the member are as follows: Horizontal members: 1500 mm^2; vertical members: 1800 mm^2; inclined members: 2500 mm^2. Take E = 200 GPa. **(20 marks)**

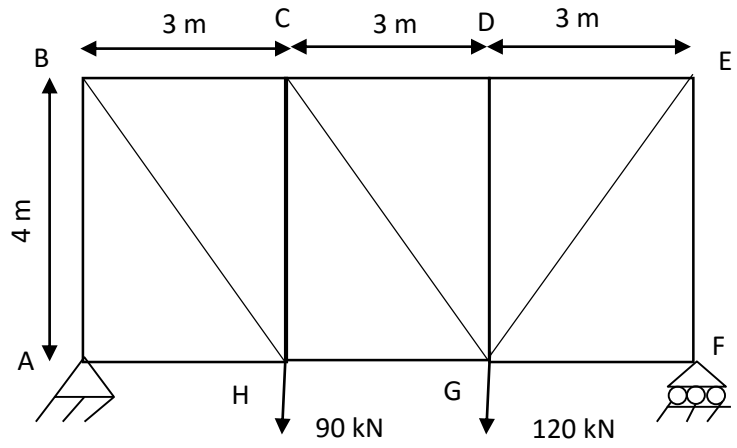

Fig. Q. No. 5.

6. Analyze the beam shown in Fig. Q. No. 6. by consistent deformation method. Also draw BMD. Assume EI as constant. **(20 marks)**

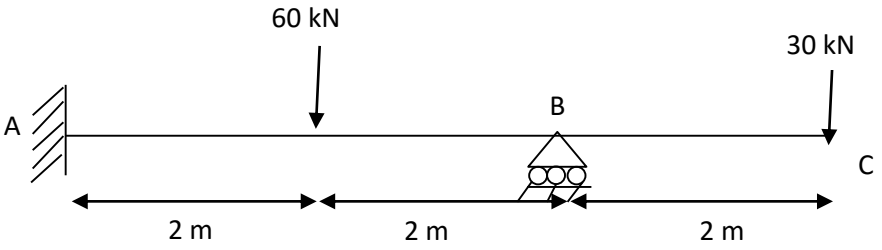

Fig. Q. 6.

7. Obtain the end moments of the beam as shown in Fig. Q. No. 7.by slope deflection method. **(20 marks)**

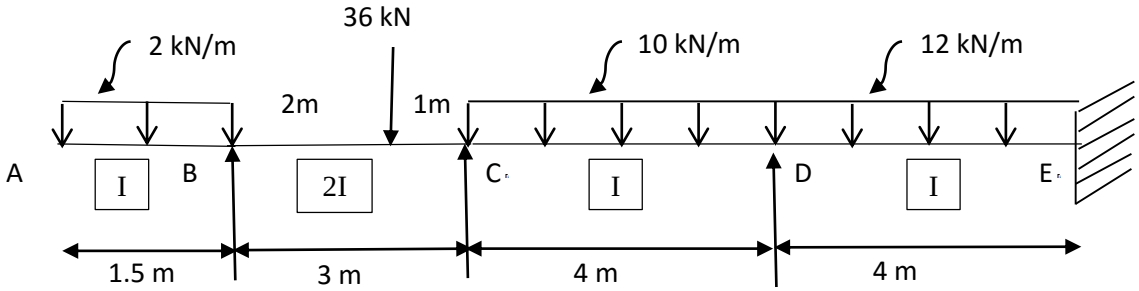

Fig. Q. No. 7.

8. Obtain the end moments of the frame shown in Fig. Q. No. 8 by moment distribution method.

(20 marks)

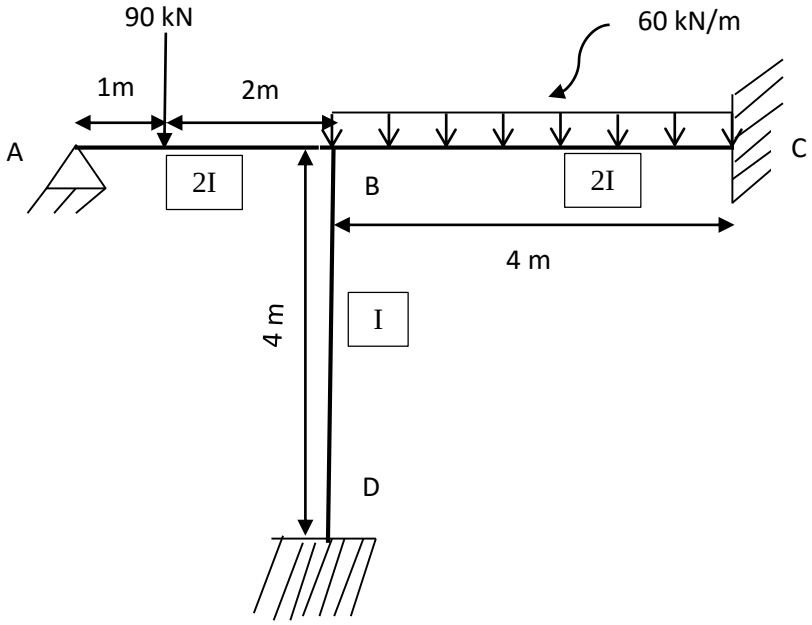

Fig. Q. No. 8.