Reg. No.											

INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

IV SEMESTER B.S. DEGREE EXAMINATION - OCT. / NOV. 2017

SUBJECT: STRUCTURAL ANALYSIS (CE 242)

(BRANCH: CIVIL)

Saturday, 11 November 2017

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

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

1A. State and explain the two moment-area theorems used in the determining of slope and deflection in beams.

1B. A beam AB of span 6m carries a point load of 45 kN at a distance of 4 m from the left end A. Find (i) slope at A and B (ii) deflection under the load . Take E = 200 GPa, I = 8.325 X 10^7 mm^4. Use conjugate beam method. **(5+15)**

2. Determine the deflection and rotation at the free end of the cantilever beam shown in Fig. Q. No.2 using unit load method. E = 2X 10^8 kN/m^2, I = 12 x 10^6 mm^4. **(20)**

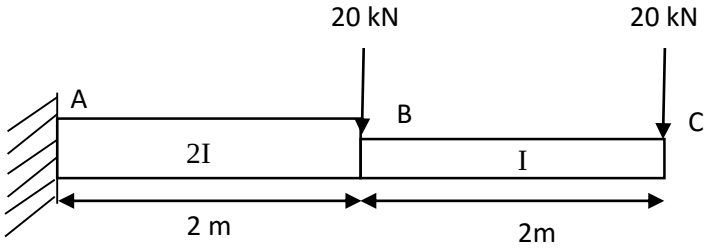

Fig. Q. No. 2

3A. Define (i) Maxwell's theorem of reciprocal deflection (ii) Castigliano's theorem.

3B. Determine the horizontal displacement of roller at point A of the frame shown in Fig. Q. No. 3B. using Castigliano's theorem. E = 2 X 10^8 kN/m^2, I = 50 x 10^7 mm^4. **(5+15)**

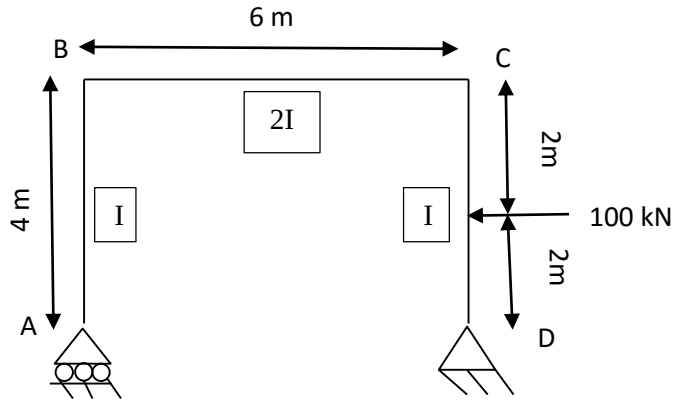

Fig. Q. No. 3

4. Calculate the difference in levels between the springing A and B of a three hinged parabolic arch shown in Fig. Q. No. 4. Determine the reaction at the support and maximum bending moment in the span AC. Also calculate the normal thrust and radial shear at a section 3m from left support. **(20)**

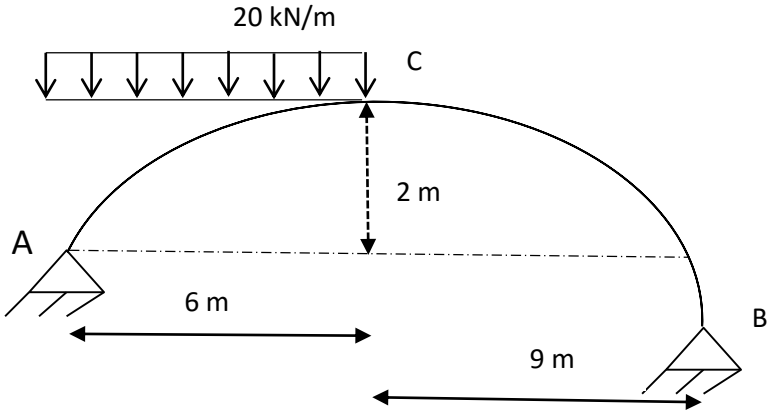

Fig. Q. No. 4

5. Analyse the fixed beam shown in Fig. Q. No. 5 by Castigliano's method and draw BMD. **(20)**

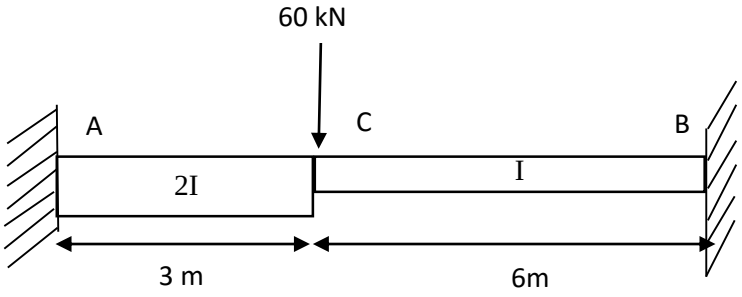

Fig. Q. No. 5

6A. Explain determinate and indeterminate structures.

6B. Determine the support reaction of the frame shown in Fig. Q. No. 6B using consistent deformation method. Assume EI is constant. **(5+15)**

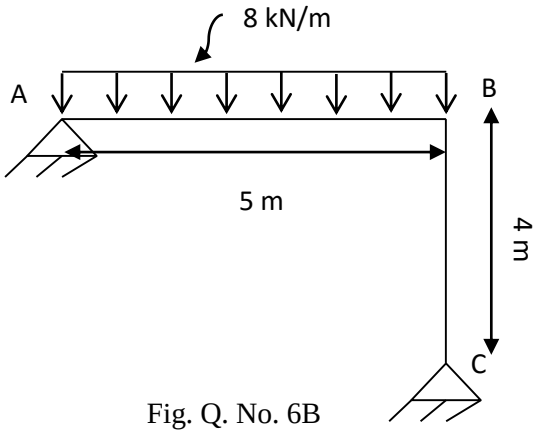

Fig. Q. No. 6B

7. Obtain the end moments of the continuous beam loaded as shown in Fig. Q. No. 7 by the slope deflection method. Support B sinks by 10mm. E = 200 GPa, I = 16 X 10^7 mm^4. **(20)**

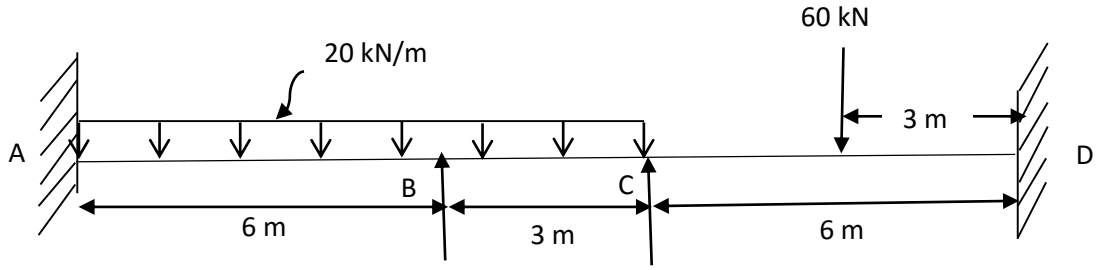

Fig. Q. No. 7

8. Obtain the end moments of the frame shown in Fig. Q. No. 8 by moment distribution method. Assume EI is constant. **(20)**

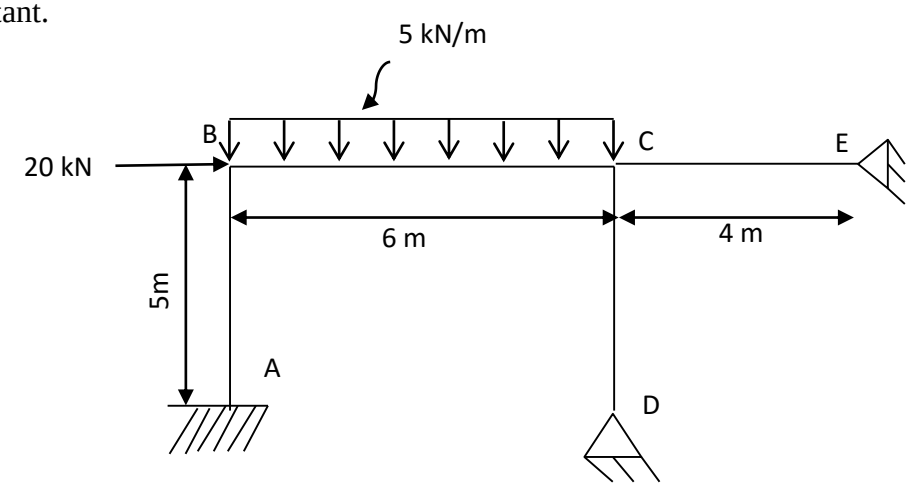

Fig. Q. No. 8