Reg.No.									

INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

IV SEMESTER B.S. DEGREE EXAMINATION – APRIL / MAY 2017

SUBJECT: STRUCTURAL ANALYSIS (CE 242)

(BRANCH: CIVIL)

Tuesday, 25 April 2017

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

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

1A Calculate vertical deflection at C and slope at B for the beam shown in fig. 1A by moment area method.

1B Calculate maximum bending moments in the left and right portions of three hinged parabolic arch shown in fig. 1B. **10+10**

2A Calculate radial shear and normal thrust at mid span of left potion of three hinged parabolic arch shown in fig. 2A.

2B Calculate vertical deflection at midpoint and slopes at A and B for the beam shown in fig. 2B by conjugate beam method. **10+10**

3A Calculate horizontal movement of roller at D for the frame shown in fig. 3A by dummy load method. Take $E=2X10^{8}kN/m^{2}$ and $I=3X10^{-4}\ m^{4}$.

3B By unit load method, calculate the vertical deflection of joint D for the truss structure shown in fig. 3B. All tension members are stressed to 100 N/mm^{2} and compression members are stressed to $50N/mm^{2}$. Take $E=200kN/mm^{2}$. **10+10**

4A Draw SFD and BMD for the beam shown in fig. 4A by minimum strain energy method (Castigliano's II theorem).

4B Obtain fixed end moments for a fixed beam loaded with a point load of 'W'kN at a distance 'a' from left support or 'b' from right support. Adopt consistent deformation method. Take total span of the beam as L **10+10**

5A Draw SFD and BMD for the beam shown in fig. 5A by minimum strain energy method (Castigliano's II theorem).

5B Calculate support reactions for the frame shown in fig. 5B by minimum strain energy method (Castigliano's II theorem). **14+6**

6A Draw SFD and BMD for the beam shown in fig. 6A by minimum strain energy method (Castigliano's II theorem).

6B Draw SFD and BMD for the beam shown in fig. 6B by consistent deformation method. **10+10**

7 Draw SFD and BMD for the structure shown in fig. 7A by slope-deflection method. **20**

8A Draw SFD and BMD for the beam shown in fig. 8A by moment distribution method if support B sinks by 10mm. Take $E=2X10^8$kPa and $I=100X10^{-6}$ m^4.

8B Define:

i) Relative stiffness ii)Carry over factor iii) Distribution factor **14+6**

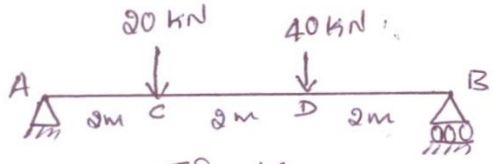

Fig. 1A

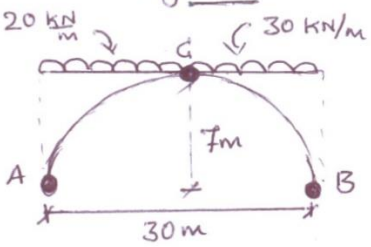

Fig. 1B

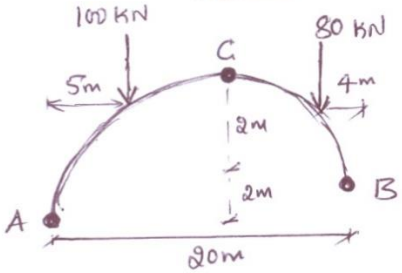

Fig 2A

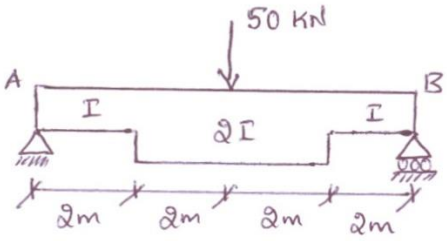

Fig. 2B

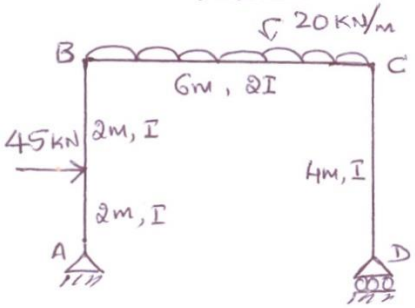

Fig. 3A

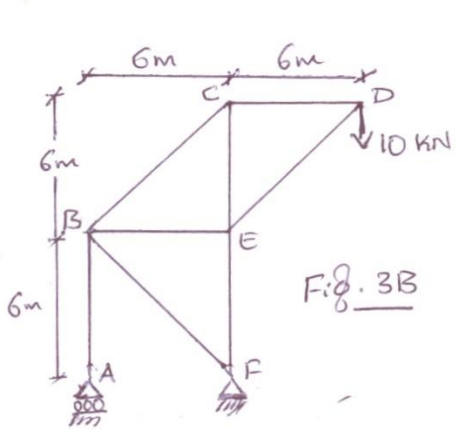

Fig. 3B

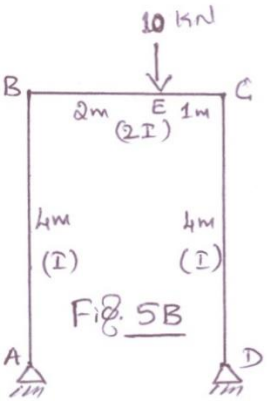

Fig. 5B

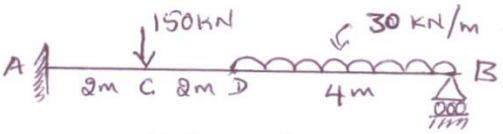

Fig. 4A

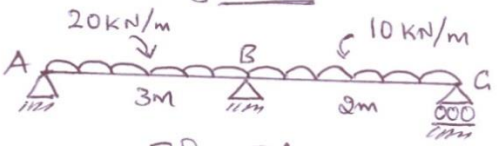

Fig. 5A

Fig. 6A

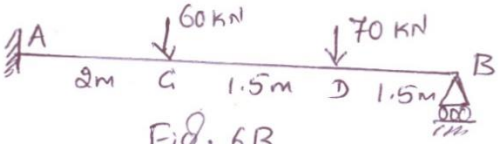

Fig. 6B

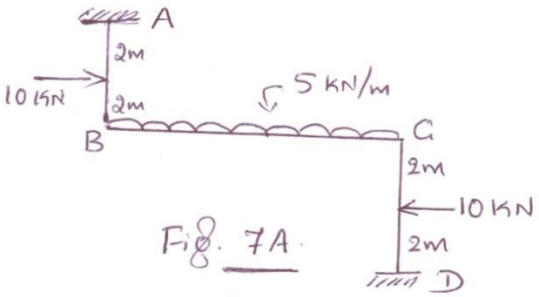

Fig. 7A

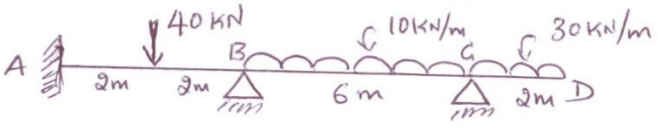

Fig. 8A