(Set-R₁)

B.Tech-6th
Structural Analysis-II

Full Marks : 70

Time : 3 hours

Answer any **six** questions including **Q. No. 1**

The figures in the right-hand margin indicate marks

1. Explain very shortly :   2×10

    (*i*)   Elastic limit

    (*ii*) Plastic section modulus

    (*iii*) Shape factor

    (*iv*) Kinematic indeterminacy

    (*v*)   Lower bound theorem

    (*vi*) Load factor

    (*vii*) Relative stiffness

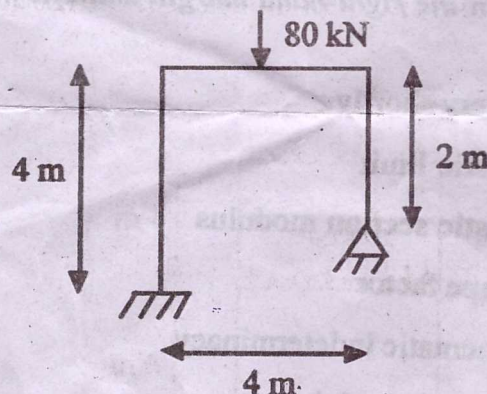   (*viii*) Carry over factor

    (*ix*) Sway moment

(2)

    (x) Degree of static and kinematic indeter-
        minacy of a fixed beam.

2. Determine the end moments and draw the bending
   moment diagram of the frame that supports a
   load at the middle as shown below. All members
   have same flexural rigidity. Use moment
   distribution method.   10

3. A two span continuous beam ABC ($AB = 6.0$ m
   and $BC = 4$ m) is fixed at support A and simply
   supported at B and C. It carries a point load of
   20 kN at 1.0 m from A and a uniformly distributed
   load of 1 kN/m over the span BC. The beam has

constant *EI* throughout its length. Find the end moments and draw the bending moment and shear force diagram using slope deflection method. 10
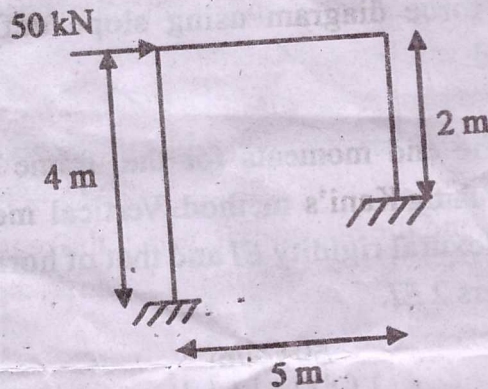
4. Find the end moments for the frame shown below using Kani's method. Vertical members have flexural rigidity *EI* and that of horizontal members 2 *EI*. 10

50 kN/m

50 kN/m

4 m

5 m

5 m
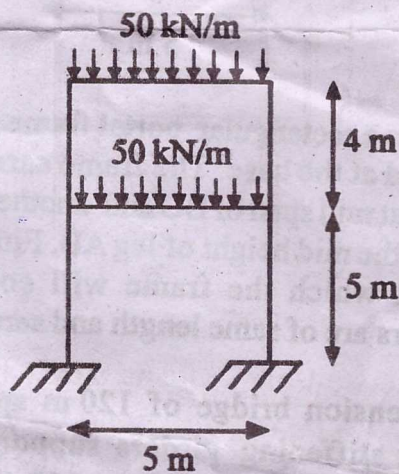
5. Analyse the frame shown below and draw its

(4)

bending moment diagram using stiffness matrix
method. *EI* constant.   10

6. ABCD is a rectangular portal frame whose legs
are fixed at the base. The frame carries a point
load W at mid span of BC and another point load
W/2 at the mid height of leg AB. Find the value
of W at which the frame will collapse. All
members are of same length and same section. 10

7. A suspension bridge of 120 m span has two
hinged stiffening girders supported by two
cables having a central dip of 12 m. The dead
load of the bridge is 6 kN/m² and the live load is
12 kN/m² which covers the left half of the

bridge span. Find the maximum tension in the cable. If the permissible stress in cable is 1000 N/mm², find the size of the cable. The road way width is 6 m.   10

8. A two hinged parabolic arch of span 30 m and rise 6 m carries a uniformly distributed load of 40 kN/m covering a distance of 12 m from left end. Find the horizontal thrust, the reactions at the hinges and the maximum hogging moment. 10

———————