R07

Set No: 1

Code No: V3102

III B.Tech. I Semester Supplementary Examinations, November/December - 2012
STRUCTURAL ANALYSIS - II
(Civil Engineering)

Time: 3 Hours   **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
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1. A three-hinged parabolic arch hinged at the supports and at the crown has a span of 24 m and a central rise of 4 m. It carries a concentrated load of 50 kN at 18 m from left support and a uniformly distributed load of 30 kN/m over the left half portion. Determine the moment, thrust and radial shear at a section 6 m from the left support.

2. (a) Explain about unit load method in two hinged arches
   (b) A semi circular two hinged arch of radius "R" and of uniform flexural rigidity carries a concentrated load "W" acting at a section making an angle with the horizontal. Find the horizontal thrust.

3. (a) State the assumptions made in the methods of analysis of building frames subjected to lateral loads by
       (i)   Portal method (ii) Cantilever method
   (b) Explain the method of analysis of building frame subjected to lateral loads at joints by portal method and cantilever method.

4. A single bay single storey portal frame ABCD is fixed at A and D. AB and DC are the two columns and BC is the beam. The height of the column AB is 5.5m and that of DC is 6.5m. The span of the beam BC is 9.5m. A uniformly distributed load of 56kN/m is acting on the whole span BC. All members have the same flexural rigidity. Calculate the support reactions and also draw the bending moment diagram for the portal frame. Use slope deflection method

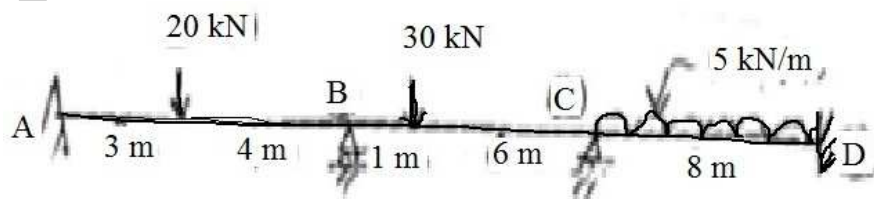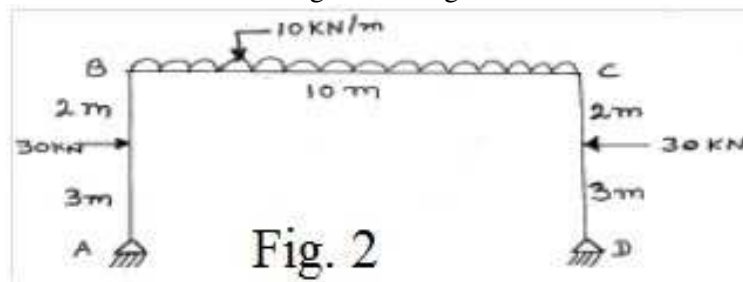5. Analyse the structure as shown in Fig. 1 using moment distribution method and draw BMD

Fig. 1

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6. Analyse the structure shown in Figure 2 using kani's method and draw BMD

Fig. 2

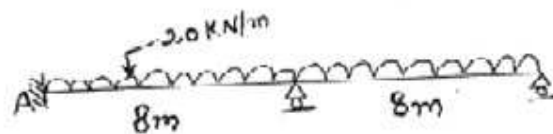7. Analyse the structure shown in Fig. 3, using flexibility matrix method and sketch BMD

Fig. 3

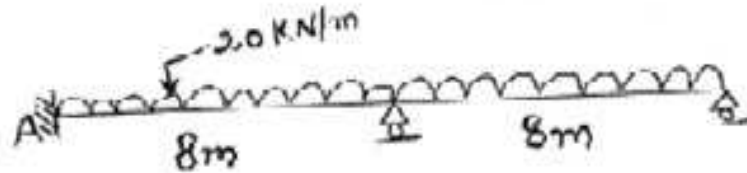8. Analyse the structure shown in Fig. 4 using stiffness matrix method. Draw BMD

Fig. 4

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Set No: 2

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1. A parabolic arch hinged at the springing and crown has a span of 20 m. The central rise of the arch is 4 m. It is loaded with a uniformly distributed load of intensity 2kN/m on the left 3 m length. Calculate:
   (i) The direction and magnitude of reactions at the hinges.
   (ii) The bending moment, normal thrust and shears at 4m and 15m from the left end

2. (a) Explain how two-hinged arches are analyzed
   (b) Explain the effect of temperature, Rib shortening on two hinged arches

3. Explain the Portal method for analyzing a building frame subjected to horizontal forces.

4. A single bay single storey portal frame ABCD is fixed at A and D. AB and DC are the two columns and BC is the beam. The height of the column AB is 6m and that of DC is 7m. The span of the beam BC is 10m. A uniformly distributed load of 60 kN/m is acting on the whole span BC. All members have the same flexural rigidity. Calculate the support reactions and also draw the bending moment diagram for the portal frame. Use slope deflection method.

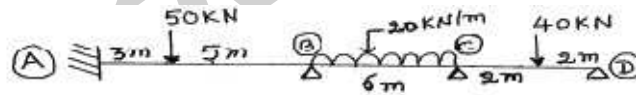5. Analyse the continuous beam as shown in Fig 1using moment distribution method and draw BMD. Take Ez=constant

Fig. 1

6. (a)Explain how settlement of supports in accounted in to Kani's method of analysis of structures.
   (b)Explain how portal frames with side sways are analysed

7. Analyse the beam shown in Fig 2 using flexibility matrix method if the support B' sinks by 50mm. $E=25 \times 10^3$ MPa, $I=140 \times 10^3$ cm^4

Fig. 2

8. Analyse the continuous beam shown in Fig 3using stiffness method and draw BMD
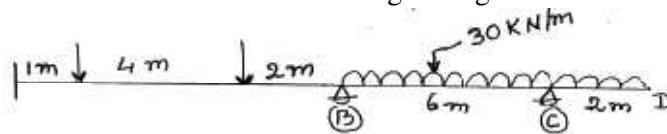

Fig. 3

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1. A three hinged parabolic arch has a span of 60 meters and rise of 15 meters. The arch carries two concentrated loads of 250kN and 200kN at distances of 10m and 18m from the left end. It also carries a UDL of 70kN/m on the right half of the span. Calculate the vertical and horizontal reactions at supports. Also calculate the normal thrusts and radial shear at a section 18m from left support.

2. A two hinged parabolic arch of span 30 m and central rise of 6 m is carrying a uniformly distributed load of 20 KN/m over left half of the span. If $I_c = I \sec \theta$ is constant, find out the values of horizontal thrust as well as maximum positive and negative bending moment over the arch

3. State the assumptions made in cantilever method of frame analysis. Analyze the frame Shown in figure 1, by cantilever method and draw the bending moment diagram. Assume that interior columns are having cross sectional area thrice than that of exterior columns
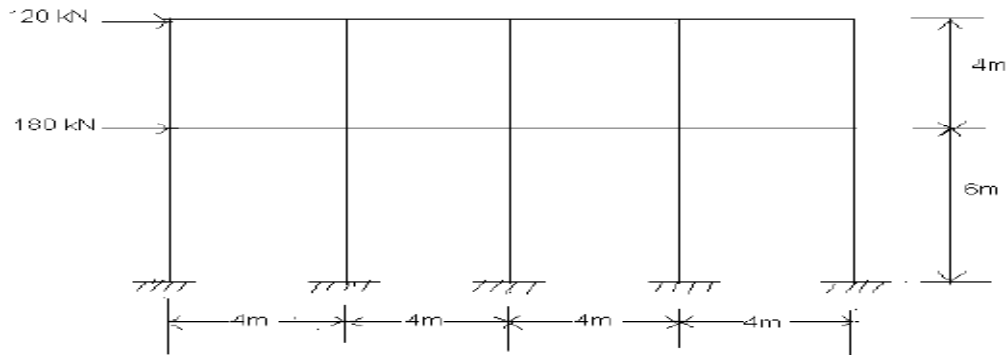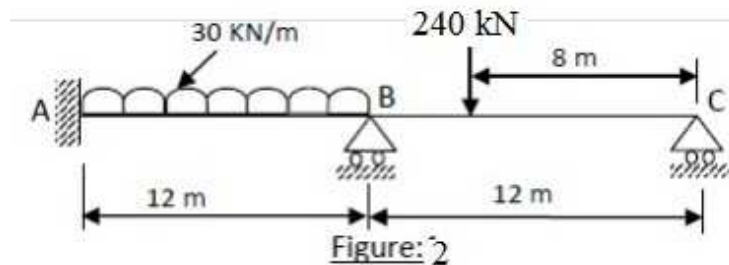

Fig. 1

4. A continuous beam is loaded as shown in figure (2). The support 'B' sinks by an amount of 3 cm. Take E= 2×10^5 N/mm^2 and I = 2×10^5 cm^4. Calculate the support moments and draw BM diagrams and shear force diagram use slope deflection method in analyzing the beam.

Figure: 2

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5. Analyze the symmetric portal frame shown in figure 3. By moment distribution method
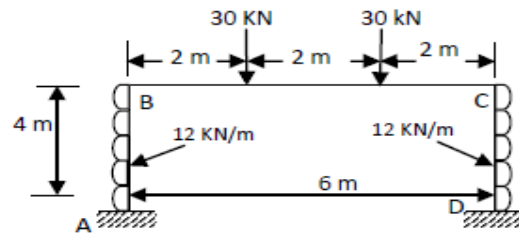

figure 3

6. (a) Define (i) Rotation factor (ii) stiffness of joint
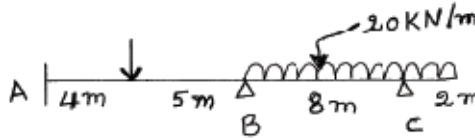   (b) Analyse the beam shown in Fig 4, using Kani's method and draw BMD

Fig. 4

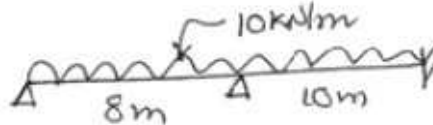7. Analyse the beam shown in Fig 5, using flexibility matrix method and draw BMD

Fig. 5

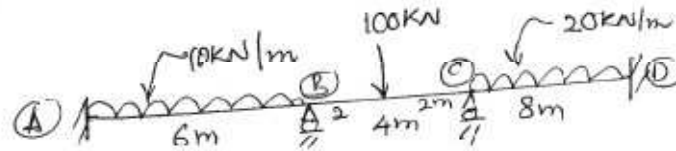8. Analyse the beam shown in Fig. 6 using stiffness matrix method. Draw BDM and SFD

Fig. 6
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1. A parabolic arch rib, 20 m span and 3 m rise is hinged at the abutments and the crown and carries a point load of 10 kN at 7.5 m from the left hand hinge. Calculate the horizontal thrust and the bending moment at a section 7.5 m form right hand hinge. What is the value of the greatest bending moment in the arch, and where does it occur?

2. A two hinged parabolic arch of span 30m and rise 6m carries a uniformly distributed load of 20kN/m covering a distance of 12m from left end. Find the horizontal thrust and the reactions at the two supports. Also calculate the maximum hogging moment in the arch

3. Analyse the frame shown in figure, 1 by Cantilever method. Assume that all the columns have equal area of cross-section for the purpose of analysis
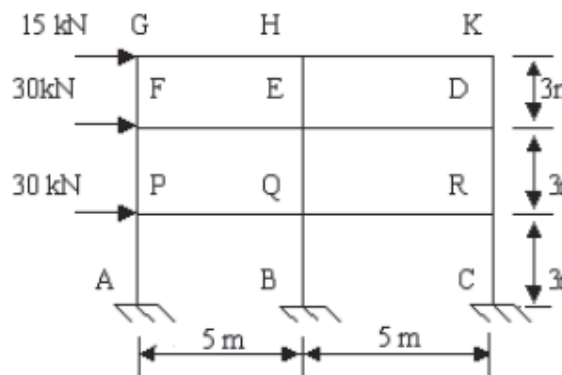

Figure 1

4. Analyze the sway frame ABCD fixed at supports A and D, A load of 40 KN/m is acting on portion BC. The length of AB is 4 m, BC and CD are 6 m using slope deflection method and draw BMD diagram.

5. (a) Define (i) carry over factor (ii) Distribution factor
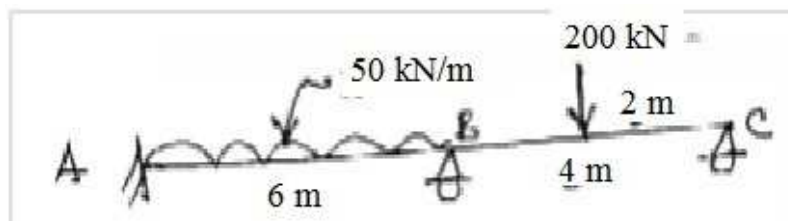   (b) Analyse the structure shown in Fig 2, by moment distribution method and draw BMD take Ez=constant.

Fig. 2
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6. (a) Explain Kani's method of solving a frame subjected to sway forces
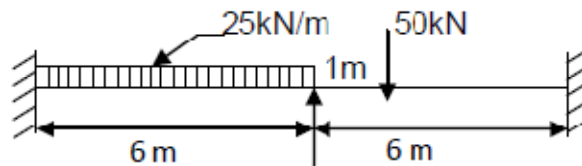   (b)Evaluate the bending moment and shear force diagrams of a beam in figure 3 by the   Kani's method

Fig. 3

7. (a) Compare and contrast the flexibility method and stiffness method
   (b) Explain how settlement of support is taken in to account in the analysis of beams using flexibility matrix method.

8. Analyse the structure shown in Fig 4 using stiffness matrix method and sketch bending moment diagram
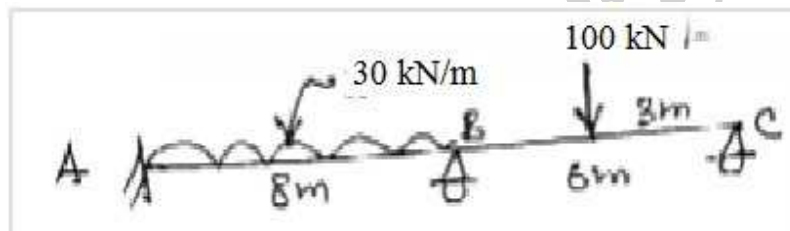

Fig. 4
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