Code No: RR320102 **Set No. 1**

III B.Tech II Semester Supplementary Examinations,
November/December 2005
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 unit load rolls on a three hinged arch of horizontal span L and central rise y_c. If it is hinged at springings and crown obtain the Influence Line Diagrams for
   (a) Horizontal thrust
   (b) B.M.
   (c) Normal thrust and
   (d) Radial shear sketch the same. [4+4+4+4]

2. (a) What is the statical indeterminacy of three-hinged, two-hinged and fixed arches?
   (b) Derive the expression for evaluating the horizontal thrust in a two-hinged arch.
   (c) What happens if I = I_o sec θ? [4+6+6]

3. (a) Obtain an expression to find the length of a cable, carrying u.d.l of "w" per unit length supported from two points distance "L" apart not at the same level, the lowest point being h_1 below left support and h_2 below right support.
   (b) What will be the horizontal support reactions? [10+6]

4. Using Kani's method determine the support moments for the three-span continuous beam with fixed end supports shown in Figure 1 (EI = constant). Sketch the B.M. and S.F. D. [16]

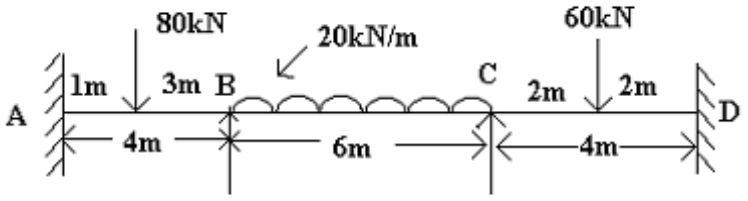

Figure 1:

5. Analyse the two-span continuous beam loaded as shown in Figure 2 by the slope deflection method, if the moment by inertia of span AB = I, while that of BC = 3I. Sketch the B.M. and SFD [16]

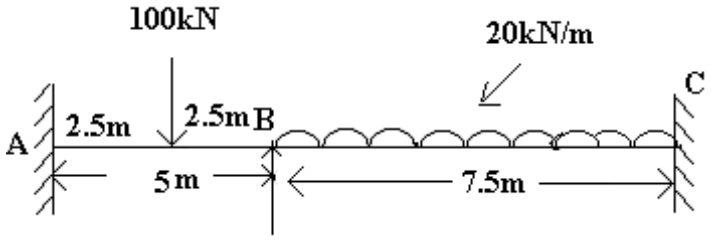

Figure 2:

6. Using moment distribution method analyse the two span continuous beam loaded as shown in Figure 3 if the moment of inertia of AB = I while that of BC = Z I. The ends A and C are simply- supported. Sketch the B.M. and S.F. diagram.[16]

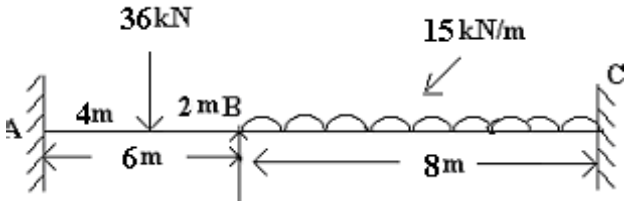

Figure 3:

7. Analyse the two-span continuous beam loaded as shown in Figure 4 if the beam has an internal hinge at B. Use Flexibility method by making a cut at E. Obtain the support moments and reactions. Sketch the B.M.D [16]

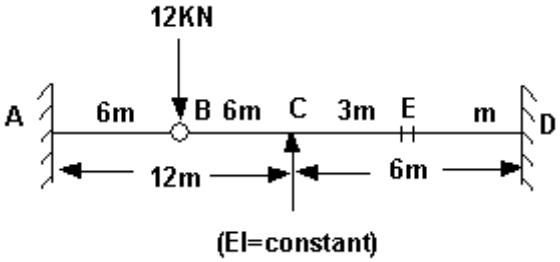

Figure 4:

8. What is Finite Element Method? Summarise the steps involved in the Finite Element Analysis procedure. [16]

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Code No: RR320102 **Set No. 2**

III B.Tech II Semester Supplementary Examinations,
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STRUCTURAL ANALYSIS-II
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) How are arches classified based on shape and end conditions?
   (b) State and prove Eddy's theorem. [6+10]

2. (a) What is the statical indeterminacy of three-hinged, two-hinged and fixed arches?
   (b) Derive the expression for evaluating the horizontal thrust in a two-hinged arch.
   (c) What happens if I = I_o sec θ? [4+6+6]

3. (a) With the help of neat sketches explain the components of a suspension bridge.
   (b) What is the purpose of providing "stiffening girder"? [8+8]

4. A two span continuous beam ABC has spans AB = 3m and BC = 4m and the end A and C are simply supported. On AB there is a load of 36 kN at 2m from A, while on BC there is a u.d.l. of 18 kN/m. If the moment of inertia of BC is 1.5times that of AB, analyse the beam using Kani's method. Sketch the B.M. and S.F.D. [16]

5. The support B of the two-span continuous beam shown in Figure 1 sinks during loading by 10mm. Using slope-deflection method, analyse the beam and sketch the B.M. and S.F. diagrams. (E = 200 GN/m^2 and I = 100×10^{-6} m^4) [16]

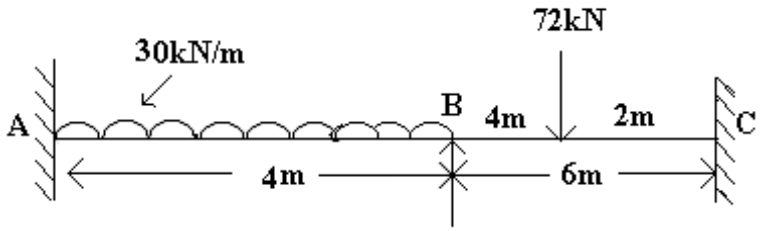

Figure 1:

6. During loading the support B of the continuous beam ABC shown in Figure 2 sinks by 10mm. Using moment distribution method find out the support moments, sketch the B.M. and S.F. diagrams. E = 200 GN/m^2 and I = 100 × 10^{-6} m^4.[16]

7. Analyse the two-span continuous beam loaded as shown in Figure 3 by the Force method. Sketch the B.M.D (E I = constant). [16]

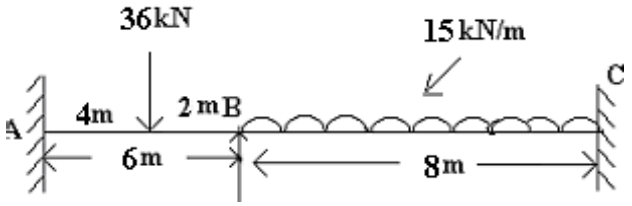

Figure 2:

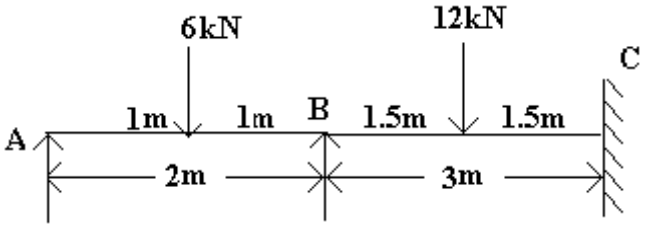

Figure 3:

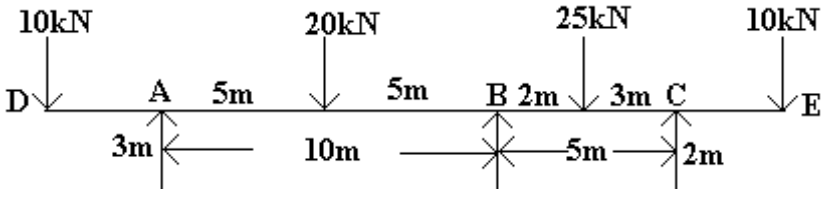

Figure 4:

8. Analyse the continuous beam loaded as shown in Figure 4 by the stiffness method, if there are overhangs on both sides. Sketch the B.M. and S.F. diagrams. [16]

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Code No: RR320102 **Set No. 3**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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⋆ ⋆ ⋆ ⋆ ⋆

1. (a) How are arches classified based on shape and end conditions?
   (b) State and prove Eddy's theorem. [6+10]

2. A two hinged segmental arch of span 40m subtends an angle of 90^o at the centre. It carries a u.d.l. of 10 k N/m over the left half of the span. Calculate the horizontal thrust and reactions at the support hinges. [16]

3. (a) What is the difference between an "arch" and a "cable" in structural action.
   (b) With the help of a neat sketch explain the general cable theorem, and prove it. [8+8]

4. Analyse a two-span continuous beam ABC having the end supports A and C fixed and spans AB = 4m and BC = 6m. On AB there is a u.d.l. of 10 kN/m while on BC there is a point load of 30kN at 2m from C. The moment of inertia of BC is twice that of AB. Sketch the B.M. and S.F.D. [16]

5. Find the support moments of the continuous beam loaded as shown in Figure 1 using slope-deflection method. During loading the support B sinks by 10mm. Sketch the B.M.D. Take E = 200×10^6 kN/m^2 and I = 100×10^{-6} m^4. [16]

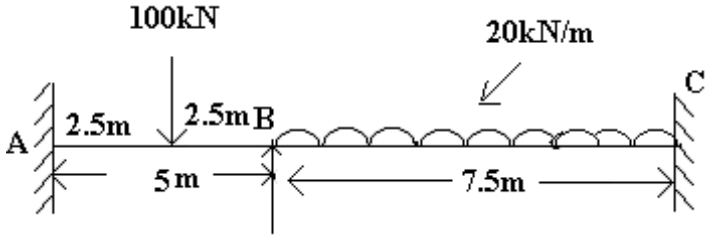

Figure 1:

6. Using moment distribution method analyse the two span continuous beam loaded as shown in Figure 2 if the moment of inertia of AB = I while that of BC = Z I. The ends A and C are simply- supported. Sketch the B.M. and S.F. diagram.[16]

7. Two steel bars having C.S.A of 20mm^2 are connected in series as shown in Figure 3 The bar AB is of length 1m while BC = 2m. If E = 200 GN/m^2 develop the flexibility and stiffness matrices and show that [F] [K] = [I]. [16]

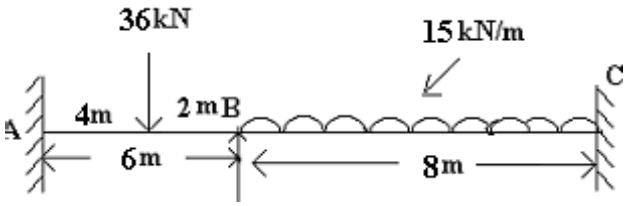

Figure 2:

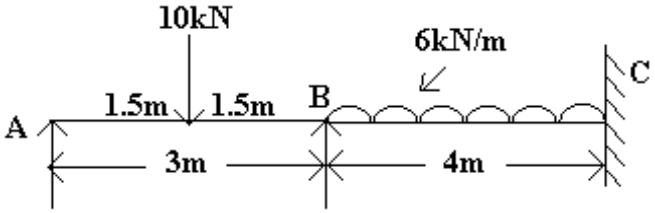

Figure 3:

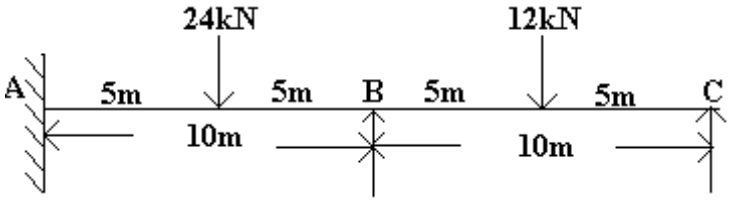

Figure 4:

8. Using stiffness-method find the support moments for the two-span continuous beam loaded as shown in Figure 4 and sketch the B.M. and S.F.D. (E I = constant).[16]

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Code No: RR320102 **Set No. 4**

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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) How are arches classified based on shape and end conditions?
   (b) State and prove Eddy's theorem. [6+10]

2. Determine the horizontal thrust in a semi-circular arch of radius R, hinged at springings, if it carries a triangular load the intensity of which varies from zero at left end to "w" per unit length at the right and (E I = constant). Find also the B.M. at crown. [16]

3. The cables of a suspension bridge of span 200 m are suspended from the top of piers which are not at the same level. The tops of piers are 18m and 12m vertically above the lowest point of the cable. The u.d.l. carried per cable = 10 kN/m. Find.
   (a) Length of the cable between the piers
   (b) Horizontal pull in the cable
   (c) Tension in the cable at the piers
   (d) Pressure on the piers assuming that the cable passes over smooth pulleys fixed at the top of the piers and the backstay at the lowest point makes an angle of 60^0 with the vertical and that of the higher pier makes an angle of 45^0 with the vertical. [4+4+4+4]

4. Analyse a two-span continuous beam ABC having the end supports A and C fixed and spans AB = 4m and BC = 6m. On AB there is a u.d.l. of 10 kN/m while on BC there is a point load of 30kN at 2m from C. The moment of inertia of BC is twice that of AB. Sketch the B.M. and S.F.D. [16]

5. Using slope deflection-method analyse the continuous beam loaded as shown in Figure 1. Sketch the B.M.D. [16]

6. During loading the support B of the continuous beam ABC shown in Figure 2 sinks by 10mm. Using moment distribution method find out the support moments, sketch the B.M. and S.F. diagrams. E = 200 GN/m^2 and I = 100 $\times$ 10^{-6} m^4.[16]

7. Using Flexibility method of analysis find the support moments for the two-span continuous beam loaded as shown in Figure 3 Sketch the BMD. (E I = constant). [16]

8. What is Finite Element Method? Summarise the steps involved in the Finite Element Analysis procedure. [16]

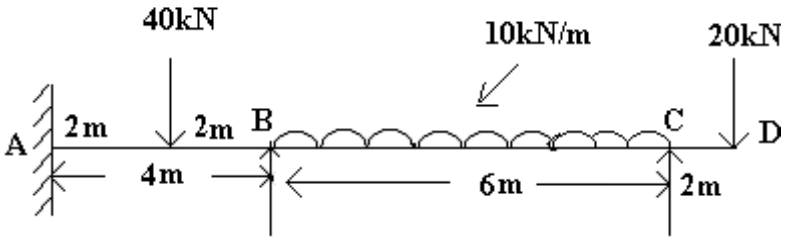

Figure 1:

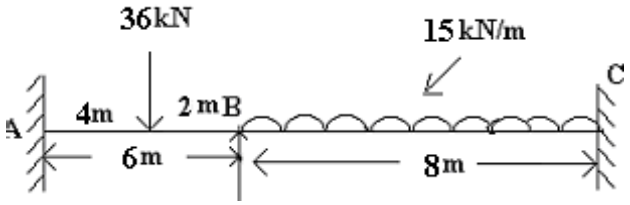

Figure 2:

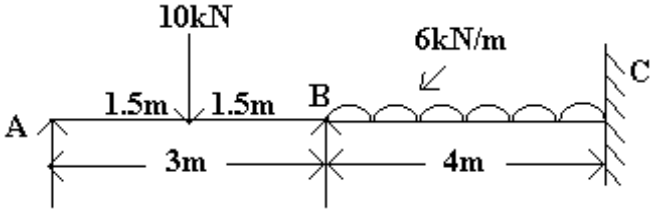

Figure 3:

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