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

III B.Tech II Semester Regular Examinations, Apr/May 2006
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. A two-hinged semi-circular arch of radius R, carries a point load W at the crown. Obtain the expression for the horizontal thrust, if EI = constant. Find the B.M. at crown and sketch the B.M.D. [16]

3. A suspension cable having horizontal span of 180m and central dip 22.5m is subjected to u.d.l of 2kN/m. Find the max. and minimum tensions in the cable. Find also the tensions in the back stay
   (a) If the Cable passes over a pulley and
   (b) If saddles are used. Take the inclination of anchor cable(backstay) with vertical as 60^o. [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. Using slope deflection method, analyse the two span continuous beam loaded as shown in the Figure 1 Sketch the B.M. and S.F. Diagram. [16]

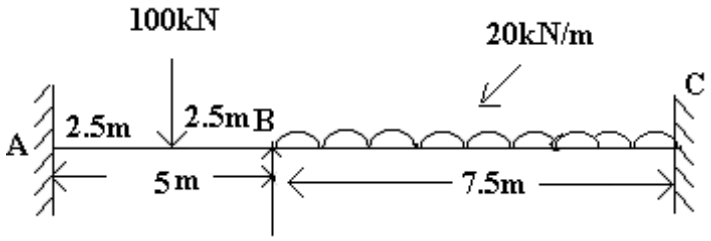

Figure 1:

6. During loading the middle support B of the continuous beam ABC, sinks by 10mm. The ends A and C as fixed as shown in Figure 2 Find the moments at A,B, C using moment distribution method. Sketch the B.M. and S.F. diagram (E =200 GN/m^2 and I = 80 x 10^{-6} m^4). [16]

7. (a) What do you understand by flexibility?

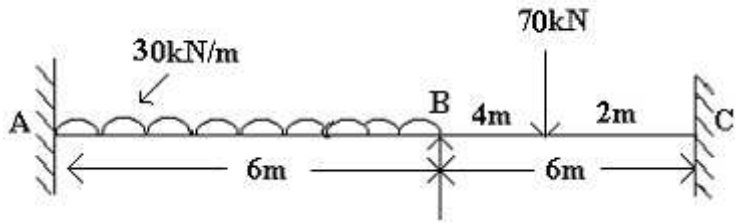

Figure 2:

(b) For the structural element shown in Figure 3 define the flexibility of the structural member AB with respect to the 4 types of displacements:

i. Axial flexibility
ii. Transverse flexibility
iii. Flexural flexibility
iv. Toxinal flexibility [4+12]

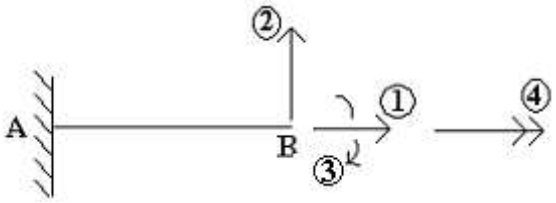

Figure 3:

8. Analyse the continuous beam loaded as shown in Figure 4 by the displacement method if the support B sinks by 10mm. Take E = 200 GN/m^2 and I =10 $\times$ 10^4 mm^4. Sketch the B.M.D. [16]

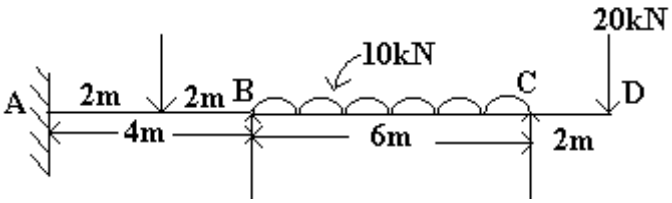

Figure 4:

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

III B.Tech II Semester Regular Examinations, Apr/May 2006
STRUCTURAL ANALYSIS-II
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. A three hinged semi-circular arch of radius R carries a u.d.l. of intensity "w" per unit length over its entire horizontal span. Find the support reactions and max B.M. Sketch the B.M.D. Obtain expressions for radial shear and normal thrust at a distance "x" from the left support hinge. [16]

2. A two - hinged semi - circular arch of radius R, carries a u.d.l of intensity "w" per unit length of entire horizontal span. Obtain the expression for the horizontal thrust, if EI = constant. Find also the B.M. at crown and sketch the B.M.D. [16]

3. (a) What is the statical indeterminacy of a fixed arch? What are hingeless arches?
   (b) Explain the concept of analyzing a fixed arch by the method of consistent deformation. [6+10]

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]

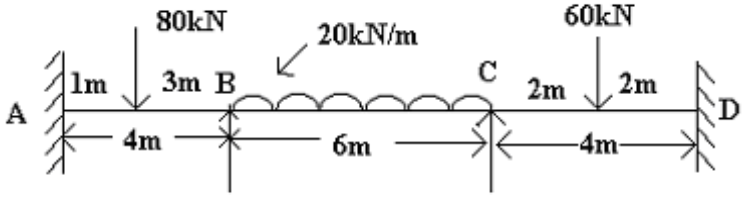

Figure 1:

5. Analyse the two-span continuous beam loaded as shown in Figure 2 by the slope deflection method, if the support B sinks by 10mm. Sketch the B.M.D. Take E = 200 GN/m^2 and I = 100 $\times$ 10^{-6} m^4. [16]

6. Analyse the two span continous beam ABC Loaded as shown in Figure 3 The ends A and C are simply supported. Use moment distribution method. Sketch the B.M. and S.F. diagram. [16]

7. (a) What do you understand by flexibility?
   (b) For the structural element shown in Figure 4 define the flexibility of the structural member AB with respect to the 4 types of displacements:

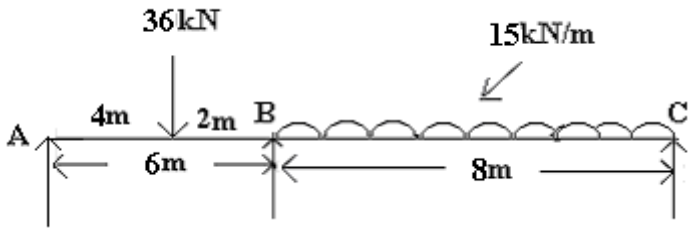

Figure 2:

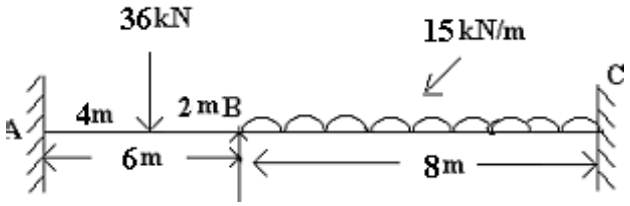

Figure 3:

i. Axial flexibility
ii. Transverse flexibility
iii. Flexural flexibility
iv. Toxinal flexibility [4+12]

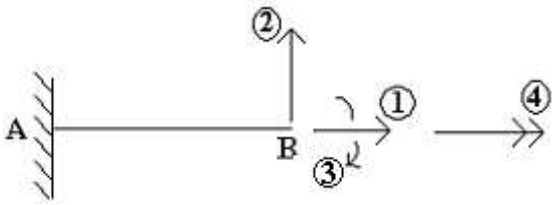

Figure 4:

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. 3**

III B.Tech II Semester Regular Examinations, Apr/May 2006
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 parabolic tied arch of span 40m and central rise 4m carries a point load of 120kN at 10m from the left support. Determine the axial force developed in the the beam and the B.M. under the load and at the crown. Assume I = I_o sec θ modulus of elasticity of rib E_r = 200 kN/mm^2 and of the rib E_t = 2000 kN/mm^2, (EI_{rib} = 15 $\times$ 10^2. C.S.A of rib A_r = 8000mm^2 of the tie A_t = 4000mm^2. [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. During loading the support C of the continuous beam shown in Figure 1 sinking by 10mm. Obtain the support moments by the slope deflection method and sketch the B.M.D. (E = 200 GN/m^2 and I = 100 $\times$ 10^{-6} m^4) [16]

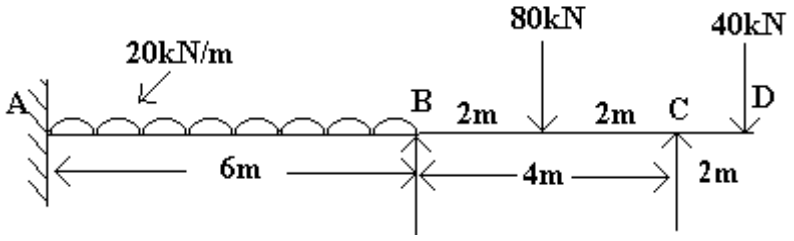

Figure 1:

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. 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]

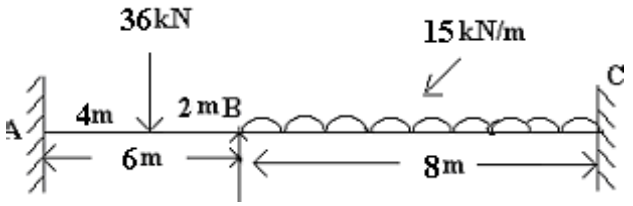

Figure 2:

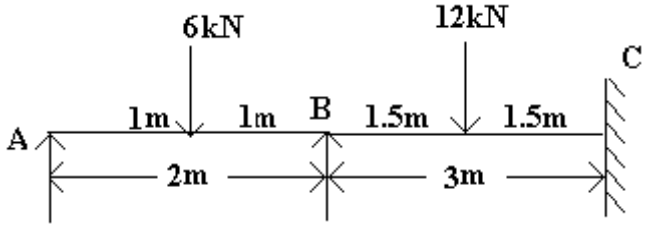

Figure 3:

8. Using the displacement method, analyse the three span continuous beam shown in Figure 4 if the spans AB and BC carry a u.d.l. of intensity "w" per unit length. Hence calculate the B.M. at B and C. [16]

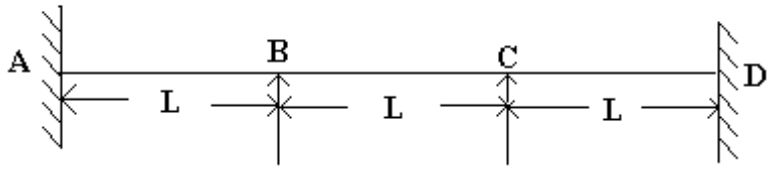

Figure 4:

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

III B.Tech II Semester Regular Examinations, Apr/May 2006
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 of horizontal span L, central rise y_c is hinged at the springings and crown. It carries two point loads of W each at equal distances of "a" from either supports. Obtain the support reactions and B.Ms at salient points. Sketch the B.M.D. [16]

2. (a) What is a "tied arch"?
   (b) Derive an expression for finding the tension in the tie. [6+10]

3. A light suspension bridge is constructed to carry a pathway 3m wide over a channel of width 21m. The pathway is supported by 6 equidistant suspenders. The cable has a central dip of 2m. Find the max. and minimum tensions in the cable if the load is of intensity 1 kN/m^2. Find also the necessary dia of the cable if the permissible tensile stress in the cable = 1.2 kN/cm^2. [16]

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. (a) Derive the slope deflection equations.
   (b) Explain the analysis of continuous beam by the slope-deflection method.[6+10]

6. Analyse the two span continous beam ABC Loaded as shown in Figure 1 The ends A and C are simply supported. Use moment distribution method. Sketch the B.M. and S.F. diagram. [16]

Figure 1:

7. Find the moments at the supports A,B and C of the continuous beam loaded as shown in Figure 2 if the moment of inertia of AB = I, while that of BC = 2 I. Sketch the B.M.D. Use Force method ofo analysis. [16]

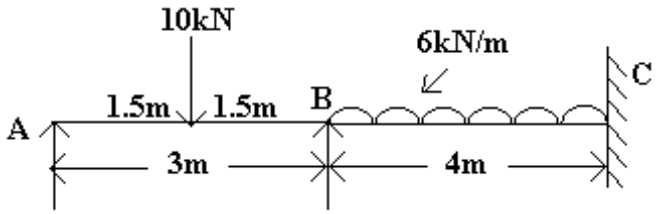

Figure 2:

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

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