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

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Draw the bending moment and shear force diagram of a propped cantilever beam of span 6m due to a point load of 6 kN at the mid span. [16]

2. Find the fixed end moments for a fixed beam of span 6 m subjected to a concentrated clockwise moment of 10 kNm at 2.5 m from the left end. [16]

3. A pin jointed warren truss of span 5m carries loads at the upper joints, as shown in Figure 1. Calculate the forces in members AC, AD, CD, and DE using tension coefficients. [16]

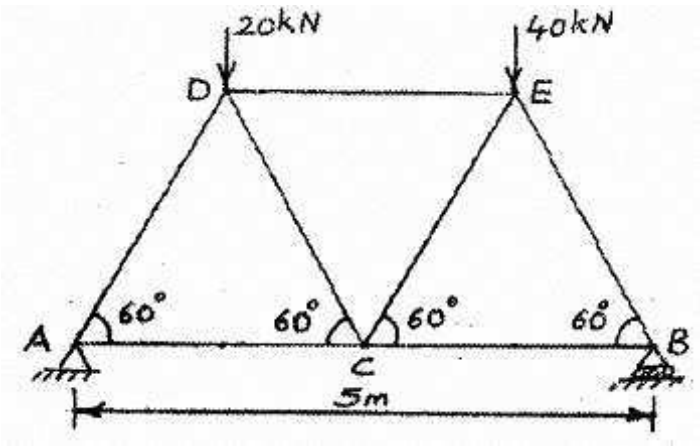

Figure 1:

4. Analyse the continuous beam shown in Figure 2 by Clapeyron's theorem of three moments if support B sinks by 10mm. Also sketch the BMD and SFD. Take E = 15 kN/mm^2 and I = $4\times10^8 mm^4$. [16]

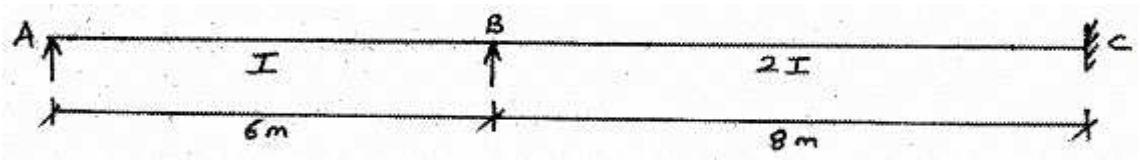

Figure 2:

5. Define Strain energy. Derive an expression for Strain energy for a linear elastic system under shear force. [16]

6. A Warren girder of through type bridge of 30m span has five panels of 6m each. All the triangles are equilateral. When the following wheel system of three loads, which may cross with the 60kN load leading, rolls along the girder, from left to right, loads are transmitted to the lower joints through cross girders at the panel points.
   Wheel load(KN) : 120 120 60
   Spacing (m) : 3 4
   Find the maximum forces in the right hand diagonal of the second panel from the left. [16]

7. An over hanging beam DABC , 14m long is supported at A and B . DA=BC=2m; AB=10m. Draw the influence lines for the reactions at A and B, shear and bending moment at section 3m from A. Hence obtain their values for a uniformly distributed load of 10kN/m, 5m long acting from A. [16]

8. While Fabricating the pin pointed frame shown in Figure 3; the member AC was the last member to be fitted, and was found to be 1mm short of the resumed lasted. Find the force in AC the diagonal members are $1000mm^2$ in area while others are $2000mm^2$ in area E = 200Gpa [16]

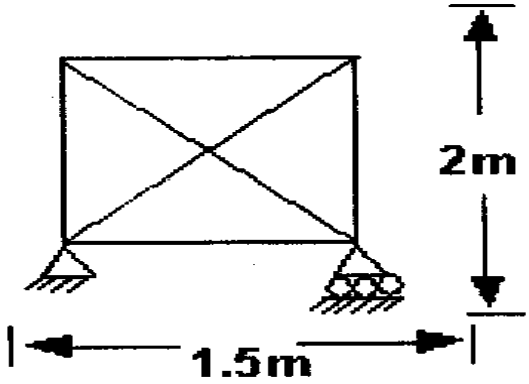

Figure 3:

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Code No: RR220104 **Set No. 2**

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

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

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1. The intensity of uniformly distributed load on the entire span of a propped cantilever beam of length 8 m is 5 kN/m. The prop is at a distance of 2 m from the free end. Draw the bending moment diagram. [16]

2. Find the fixed end moments for a fixed beam of span 6 m subjected to a concentrated clockwise moment of 10 kNm at 2.5 m from the left end. [16]

3. The space frame shown in Figure 1 is pinned to supports A, B, C and D in a horizontal plane. The member EF is horizontal and 2m above the level of the supports. The loads at the joints E and F act in a horizontal plane. Find the forces in the members of the frame using the method of tension coefficients. [16]

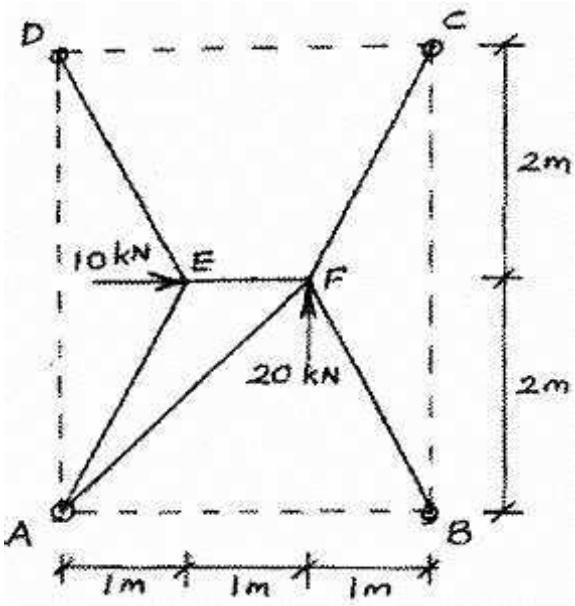

Figure 1:

4. A continuous beam ABC is fixed at A and simply supported at B and C. AB and BC are 4 m and 6 m long. The spans AB and BC carry point loads 2kN and 20 kN at the respective mid-spans. Find the bending moments at A and B and draw the bending moment diagram. [16]

5. Solve the beam shown in Figure 2 using Castigliano's theorem to obtain slope and deflection at point B. Take E = 2x10$^5 N/mm^2$.$I = 60 \times 10^6 mm^4$. [16]

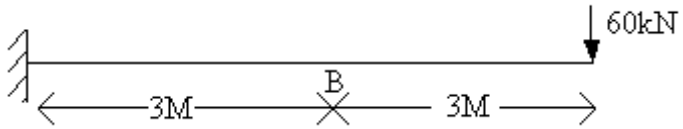

Figure 2:

6. A train of 5 wheel loads as shown below, crosses a simply supported beam of span 24m from left to right, with the 120kN load leading.
   Wheel load (kN) : 80 80 200 180 120
   Spacing (m) : 2 3 2 3
   Calculate the maximum positive and negative shear force values at the centre of the span and the absolute maximum B.M anywhere in the span [16]

7. A pratt girder consists of eight panels, each 3.5m square, the loading being on the lower bottom. Draw the influence line for the force in the diagonal of the of the third panel from the left and determine the maximum tension and compression in it due to uniformly distributed load of 100kN/m, 10m long. [16]

8. Analyse the frame shown in Figure 3. All the members have same cross sectional area of $20cm^2$. E in same for all the members. [16]

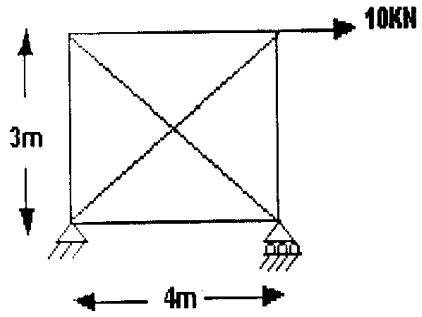

Figure 3:

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Code No: RR220104 **Set No. 3**

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

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

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1. Draw the bending moment diagram and locate the point of inflections for the propped cantilever beam shown in Figure 1. [16]

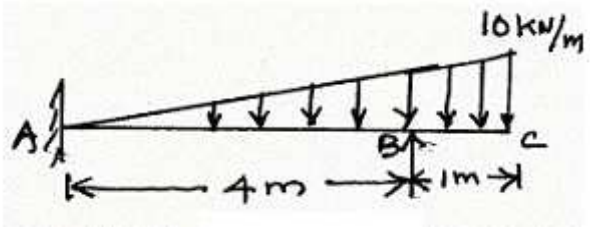

Figure 1:

2. Find the fixed end moments for a fixed beam of span 6 m subjected to a concentrated clockwise moment of 10 kNm at 2.5 m from the left end. [16]

3. The pin jointed truss shown in Figure 2 is loaded with two point loads of 20kN and 10kN at the upper joints. Evaluate the forces in the members using the method of tension coefficients. [16]

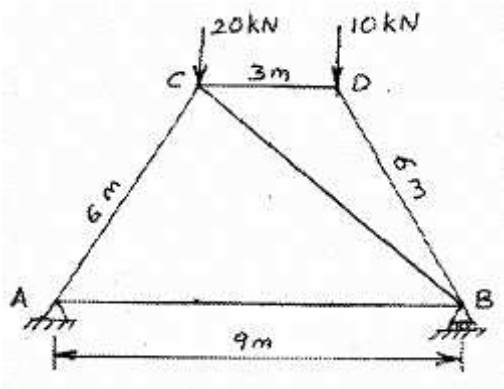

Figure 2:

4. A continuous beam ABC consists of spans AB and BC of lengths 4m and 6m respectively, the ends A and B being fixed. C is a free end. The span AB carries a uniformly distributed load of 24 kN/m while the span BC carries a point load of 108 kN at a distance of 2m from C. Find the support moments and support reactions. [16]

5. Define Strain energy. Derive an expression for strain energy for a linear elastic system under axial load. [16]

6. A train of wheel loads as shown crosses a girder of 25m span with 120kN load leading.
   Wheel load (kN) : 180 160 160 120
   Spacing (m) : 2 2 3
   Determine the maximum B.M at a section 8m from the left end and the absolute maximum B.M on the girder. [16]

7. A warren girder of 60m span is built up of triangles and has ten panels of 6m each. Draw the influence line for the left hand diagonal in the fourth panel from the left hand support. State the exact position of a single rolling load in the panel so that the force in the diagonal is zero. [16]

8. (a) What are the assumptions on which the analysis of a pin jointed plane truss are based.
   (b) A frame work commits of six bars of uniform cross sectional area and hinged together to form a square with tow diagonals, is suspended form one end. At the opposite corner a load of 10kN is-suspended. Calculate the forces in all the members. The diagonals act independently. Figure 3 [6+10]

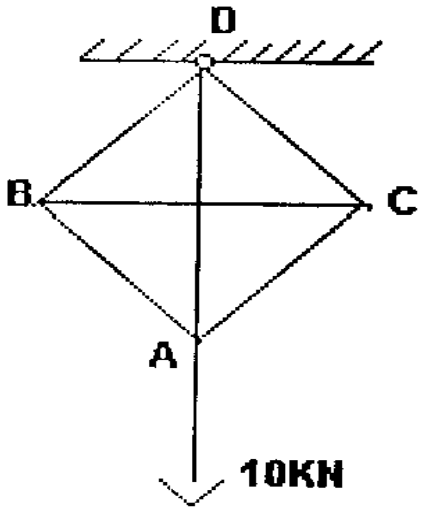

Figure 3:

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Code No: RR220104 **Set No. 4**

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

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

Answer any FIVE Questions
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1. A beam 7m long is fixed at A and simply supported at B. It carries a point load of 40 kN at C distant 4 m from A. Also it carries a concentrated couple 10 kN-m at the centre. Find the support reactions. Draw the bending moment and shear force diagrams. [16]

2. Find the fixed end moments for a fixed beam of span 6 m subjected to a concentrated clockwise moment of 10 kNm at 2.5 m from the left end. [16]

3. Four straight wires AO, BO, CO and OD are made of the same material and have the same cross section. Their upper ends are connected to a horizontal ceiling, the points A, B, C and D forming a rectangle in which AB = 2m and BC = 2.5m. The junction O is 3m vertically below a point Q on the ceiling, 1m from AB and 0.75m from AD. The connections are adjusted so that initially there is no slackness in any wire and a load of W is then suspended from O. Denoting the pull in the wire AO as P, find the pull in each of the remaining wires in terms of P and W. Use the method of tension coefficients. [16]

4. A continuous beam ABC consists of spans AB and BC of lengths 4m and 6m respectively, the ends A and B being fixed. C is a free end. The span AB carries a uniformly distributed load of 24 kN/m while the span BC carries a point load of 108 kN at a distance of 2m from C. Find the support moments and support reactions. [16]

5. In the pin jointed frame shown in Figure 1, if joint B undergoes horizontal and vertical displacements of magnitude δ_u, δ_v respectively. Find the magnitude of the load that is applied at B. If $A_1, A_2 and L_1, L_2$ represent the area of c/s and lengths of the members AB and BC respectively, with E as modulus of elasticity then what shall be the force required if the joint B has no horizontal shift. [16]

6. A train of concentrated loads as shown below move form left to right on a simply supported girder of span 16m, with the 40kN load leading
   Wheel load(kN) : 20 60 80 40
   Spacing (m) : 3 2 2
   Determine the absolute maximum shear force and bending moment developed in the beam. [16]

7. An over hanging beam DABC , 14m long is supported at A and B . DA=BC=2m; AB=10m. Draw the influence lines for the reactions at A and B, shear and bending moment at section 3m from A. Hence obtain their values for a uniformly distributed load of 10kN/m, 5m long acting from A. [16]

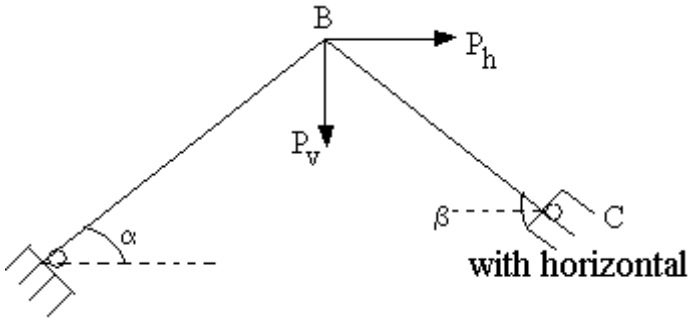

Figure 1:

8. (a) What are the assumptions on which the analysis of a pin jointed plane truss are based.

   (b) A frame work commits of six bars of uniform cross sectional area and hinged together to form a square with tow diagonals, is suspended form one end. At the opposite corner a load of 10kN is-suspended. Calculate the forces in all the members. The diagonals act independently. Figure 2 [6+10]

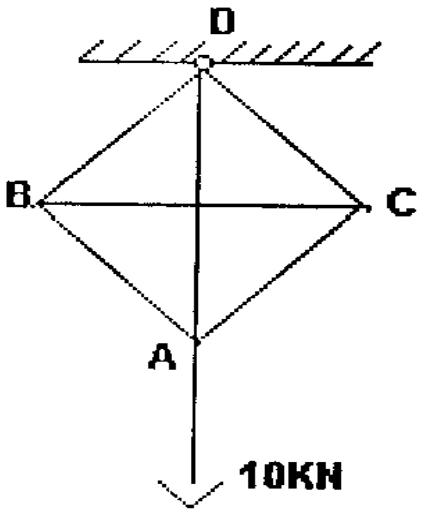

Figure 2:

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