Code No: RR-220104

Set No: 1

II-B.Tech II-Semester-Regular-Examinations-April / May-2005

STRUCTURAL ANALYSIS-I

(Civil Engineering)

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

Answer any FIVE questions

All questions carry equal marks

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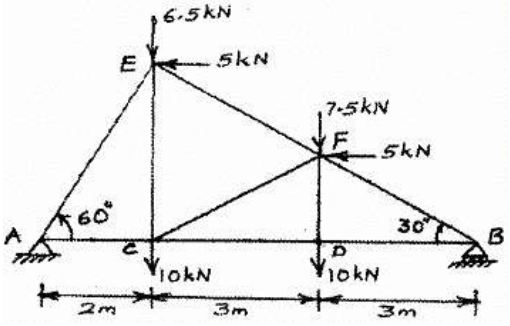
1. A propped cantilever of span 6 m is subjected to a uniformly distributed load of 4kN/m over half the span starting from the fixed support. Find the reactions and moments at the supports. EI is constant.

2. Determine the moments and reactions at the supports of the fixed-fixed beam which is loaded by a concentrated load of 10kN at a point 3 m from the left support. The span of the beam is 8 m. Use method of consistent deformations. EI is constant.

3. A pin jointed roof truss is loaded as shown in Figure. Determine the forces in members AE, AC, CE, CF, CD and EF using the method of tension coefficients.



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.

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

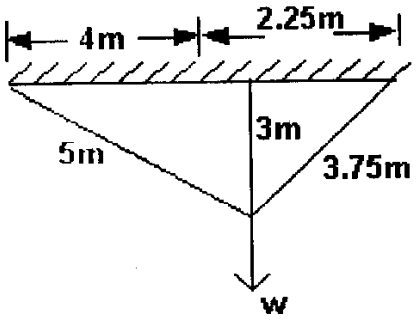
6. A single rolling load of 120kN rolls along a girder of 12m span. Draw the diagrams of maximum B.M and maximum S.F (positive and negative).

Contd…2

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.

8. a) Cite Two examples of structures that have the same degree of static and kinematic indeterminacy.

b) Three wires AD, BD and CD having the same cross sectional area and of same material support a load W as shown in figure. Determine the tensions in three wires.



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Code No: RR-220104

Set No: 2

II-B.Tech II-Semester-Regular-Examinations-April / May-2005

STRUCTURAL ANALYSIS-I

(Civil Engineering)

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

Answer any FIVE questions

All questions carry equal marks

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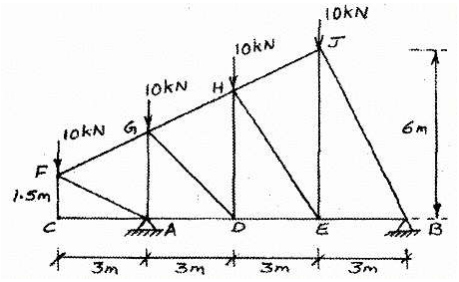
1. A propped cantilever of span 9 m is subjected to two loads 6kN and 8kN at one-third and two-third points along the span of the beam from the fixed support. Using the differential equation approach, find the reactions at the supports.

2. A fixed- fixed beam of span 8 m is subjected to a couple of 4 kN-m at a distance of 2m from the fixed support and a concentrated force of 6kN at the mid-point along the span. Using method of differential equations, find the reactions at the supports.

3. The braced frame shown in Figure. is simply supported at A and B, and carries four 10kN loads at F, G, H and J. Determine the forces in members AG, GH, GD and AD using the method of tension coefficients.



4. A continuous beam ABC consists of spans AB and BC of lengths 8m and 6m respectively. A is fixed. The point B is simply supported and end C is free. The span AB is subjected to a clockwise couple of 80 kN-m at its middle point and the span BC carries a point load of 40 kN at its middle point. Calculate the support reactions and support moments.

5. Define Strain energy. Derive an expression for strain energy due to bending moment.

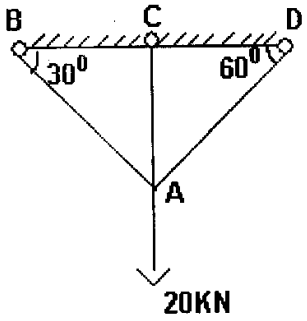
6. A moving load of 50kN/m and, 4m long, crosses a girder of 16m span. Calculate the maximum B.M at a section 5m from the left hand support.

Contd…2

7. A Pratt truss of 48m span has eight panels of 6m each. The height of the truss is 8m. Draw the influence line for the force in the bottom chord member and the diagonal of the third panel from the left. Hence calculate the maximum forces in these members for a uniformly distributed moving load of 80kN/m longer than the span.

8. a) Differentiate between the statically determinate structures and critically indeterminate structures.

   b) Analyse the frame shown in figure. Members AB and AD have area of 800mm^2 and member AC has area of 400mm^2. Take E = 2×10^5 n/mm^2.



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Code No: RR-220104

Set No: 3

II-B.Tech II-Semester-Regular-Examinations-April / May-2005

STRUCTURAL ANALYSIS-I

(Civil Engineering)

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

Answer any FIVE questions

All questions carry equal marks

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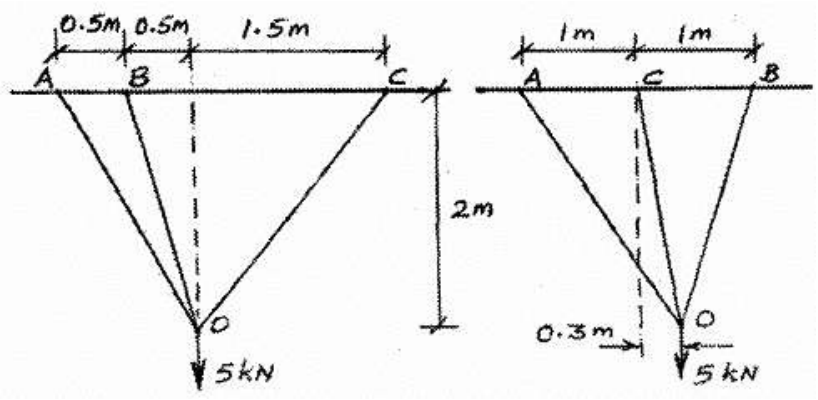
1. Draw the shear force and bending moment diagrams for a propped cantilever subjected to linearly varying load with maximum intensity of 2kN/m and zero intensity at the propped end. Use the method of consistent deformations. EI is constant.

2. A fixed-fixed beam of span 5 metres carries a point load of 100 kN at the centre and point loads of 40 kN at 2m from each end. Find the maximum positive and negative moments. Draw also the bending moment and shear force diagrams.

3. Three flexible wires AO, BO and CO are attached at their upper ends to a rigid horizontal plane and are just tight in the positions shown in Figure, when no load is applied at O. Determine the tension in each wire when a load of 5kN is applied at O. Use the method of tension coefficients.



4. A beam ABC 5.80 m long is fixed at A and simply supported at B(4 m from A) and free at C. It carries a point load of 5 kN at C. Analyse the beam for support reactions and draw the B.M.D and S.F.D.

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

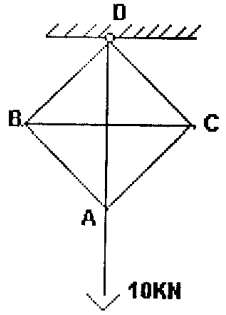
Contd…2

6. A simply supported beam of span L is crossed by a uniformly distributed load of length ‘a’ and of total weight W. If ‘L’ is greater than ‘a’, obtain from the first principles an expression for the maximum bending moment at any point distance ‘b’ from one support.

7. A warren girder of 25m span is made up of five panels of 5m each. The diagonals are inclined at 60^{o} to the horizontal. Draw the influence line for force in the lower chord member in the second panel from the left. Hence evaluate the force in it when there is a load of 100kN at each lower joint.

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

   b) A frame work consists of six bars of uniform cross sectional area and hinged together to form a square with two diagonals, is suspended from one end. At the opposite corner a load of 10kN is-suspended. Calculate the forces in all the members. The diagonals act independently.



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Code No: RR-220104

Set No: 4

II-B.Tech II-Semester-Regular-Examinations-April / May-2005

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. A beam AB 6 m long is fixed at A and simply supported at B. The beam carries a uniformly distributed load of 12 kN/m. Find what couple should be applied at B so that bending moment at A is zero. Find the central deflection of the above beam.

2. A beam of span L carries a central load W. It is so constrained at the ends that when the slope is θ , the restraining couple at the supports is $\mu\ \theta$. Find the magnitude of the restraining couple at each end. Also find the central deflection. Deflection at the ends is zero.

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.

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.

5. State and explain Castigliano's first theorem taking any example.

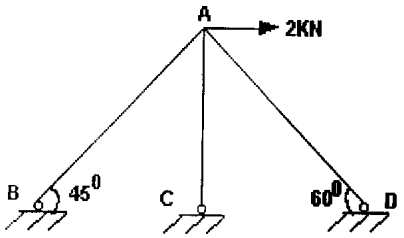
6. A load 80kN/m and, 4m long, rolls over a girder of 30m span. Calculate the equivalent uniformly distributed load.

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 third panel from the left and determine the maximum tension and compression in it due to uniformly distributed load of 100kN/m, 10m long.

Contd…2

8. a) Differentiate between static indeterminacy and kinematic indeterminacy of a structure?

b) Find the forces in the members of the frame shown in figure the quantity "AE" is constant for all the members.



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