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15CV42

Fourth Semester B.E. Degree Examination, June/July 2017
Analysis of Determinate Structure

Time: 3 hrs. Max. Marks: 80

Note: **1.** ***Answer FIVE full questions, choosing one full question from each module.***
2. ***Assume any missing data, if any.***

Module-1

1 a. Briefly explain different forms of structures. **(03 Marks)**

b. State the assumptions made in the analysis of truss. **(04 Marks)**

c. Find the forces in the numbered members of the loaded truss shown Fig.Q1(c) using method of sections.

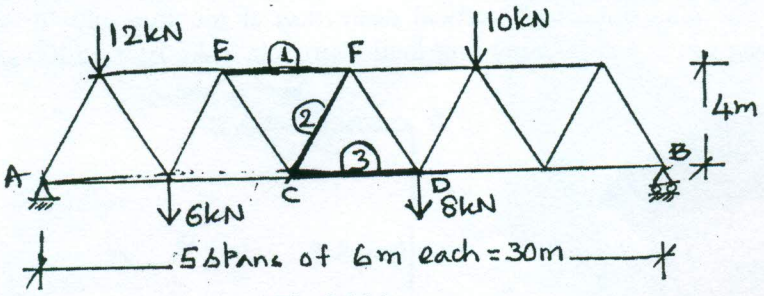

Fig.Q1(c) **(09 Marks)**

OR

2 a. Explain statically determinate and indeterminate structures with examples. **(04 Marks)**

b. Analyze the loaded truss shown in Fig.Q2(b) by method of joints and tabulate the results neatly.

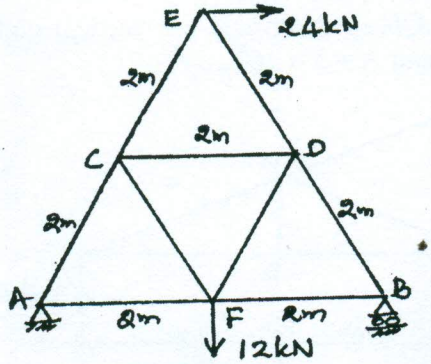

Fig.Q2(b) **(12 Marks)**

Module-2

3 a. Derive the differential equation of deflected curve for the beam. **(04 Marks)**

b. Determine the maximum deflection at the free end of a cantilever beam subjected point load W at free end of span 'L' with constant EI. Use Macaulay's method. **(06 Marks)**

c. Using conjugate beam method, find the deflection at end of a cantilever beam of span 'L' subjected udl of ω/mt run over entire span. EI constant. **(06 Marks)**

OR

4 a. State first and second moment area theorems. **(04 Marks)**

b. Find the ratio of deflection at C and D for the simply supported beam shown in Fig.Q4(b). Take E = 200 GPa, I = 6×10^7 mm^4. Use Macaulay's method.

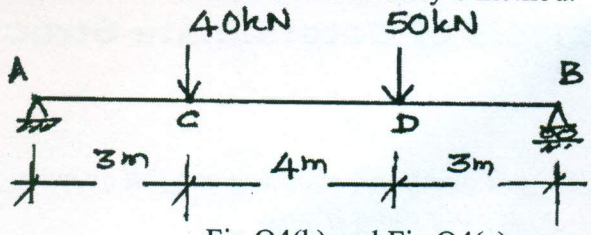

Fig.Q4(b) and Fig.Q4(c)

c. Find the maximum deflection for the simply supported beam loaded as shown in Fig.Q4(c). Use moment-area method. **(05 Marks)** **(07 Marks)**

Module-3

5 a. Derive the expression for the strain energy stored in a beam due to flexure. **(04 Marks)**

b. Find the horizontal and vertical deflection at the free end 'c' of a bent frame loaded as shown in Fig.Q5(b). Using unit load approach. Take EI = 15000 kN-m^2.

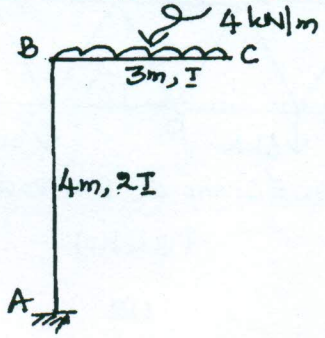

Fig.Q5(b) **(12 Marks)**

OR

6 a. For the truss shown in Fig.Q6(a), determine the vertical deflection at C by strain energy method. Take E = 210 GPa and A = 5×10^4 mm^2.

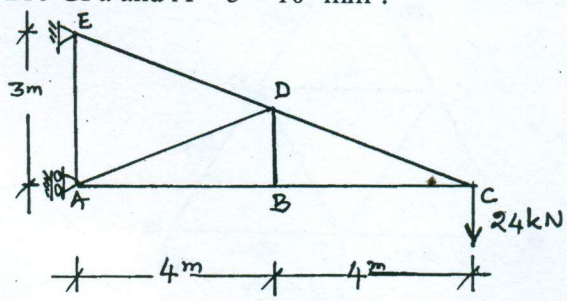

Fig.Q6(a) **(09 Marks)**

b. A cantilever beam is loaded as shown in Fig.Q6(b). Compute the deflection at point C by unit load approach. Take E = 200 GPa, I = 8×10^7 mm^4.

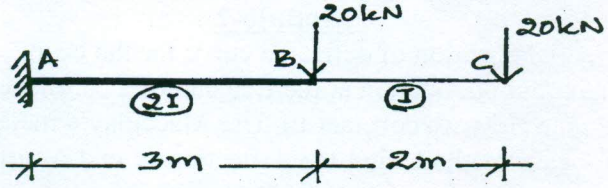

Fig.Q6(b) **(07 Marks)**

Module-4

7 a. A three hinged parabolic arch of span 30 m, rise 5m is subjected to uniformly distributed load of 20 kN/m for left half of the span. Determine support reactions at the springing levels. Also determine normal thrust, radial shear and bending moment at a section 8 m from left support. **(09 Marks)**

b. A suspension cable of span 100 m and slip 10 m carries a udl of 8 kN/m of horizontal span over the entire span. Find the maximum and minimum tension in the cable and where they occur in the cable. Find the length of cable. **(07 Marks)**

OR

8 a. A flexible suspension cable of weight 12 kN/m hangs between two vertical walls 60 mt apart, left being at a point 10 m below the right point. A point load of 200 kN is attached to cable in such a manner that the point of attachment of load is 20 m horizontally from left end wall and 5 m below the left hand support. Find the maximum and minimum tension in the cable. **(08 Marks)**

b. A parabolic arch of span 24 m with a central rise of 4 m is subjected to a point load of 30 kN at 6 m from left support and a udl of 15 kN/m over the right half of the span. Sketch BMD, also find normal thrust and radial shear at 10 m from right support. **(08 Marks)**

Module-5

9 a. What are the uses of influence line diagram? **(03 Marks)**

b. A simply supported beam of span 8m in traversed by a udl of 10 m long with intensity 20 kN/m. Draw the influence line diagram for:

i) Reaction at left support
ii) S.F at 3 mt from left support
iii) BM at 3 mt from left support.

Find the maximum values of above quantities. **(13 Marks)**

OR

10 a. A beam has a span of 20 m. Draw influence line for BM and SF at a section 8m from the left support and determine the maximum BM and SF for this section due to two point loads 80 kN and 40 kN at a fixed distance of 2m apart rolling from left to right with 80 kN load leading. **(06 Marks)**

b. Draw influence line for shear force and bending moment at a section 5 m from left support of a simply supported beam, 25 m long. Hence calculate the maximum SF and BM at this section due to uniformly distributed rolling load of 8m long with intensity 5 kN/m. **(10 Marks)**

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