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17CV42

Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
Analysis of Determinate Structures

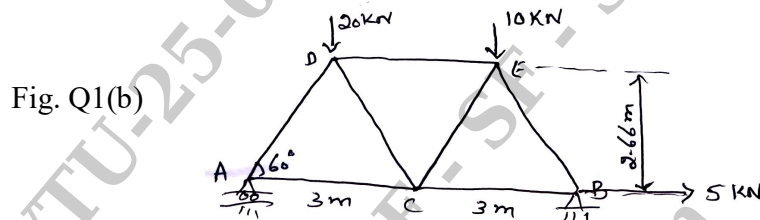Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Define Statically determinate and Statically indeterminate structure. **(04 Marks)**

   b. Determine the nature and magnitude of forces in all the members of the frame loaded by using method of joints in Fig. Q1(b). **(16 Marks)**

Fig. Q1(b)

OR

2 a. What are the Assumptions in the Analysis of trusses? **(06 Marks)**

   b. Determine the nature and magnitude of forces in all the members of the frame loaded by using method of sections in Fig. Q1(b). **(14 Marks)**

Module-2

3 A beam of uniform section measures 10m long and is simply supported at the ends. It carries concentrated loads of 100kN and 60kN at distances of 2m and 5m respectively from the left end. Calculate the deflection under each load. Find the maximum deflection also by Macaulay's method. Take $I = 18 \times 10^8 \, m^4$ and $E = 200kN/mm^2$. **(20 Marks)**

OR

4 a. Determine Slope and Deflection of simply supported beam carries a UDL by Moment Area Method. **(10 Marks)**

   b. Determine Slope and Deflection at mid span, when simply supported beam carries a concentrated load at center by Conjugated Beam method. **(10 Marks)**
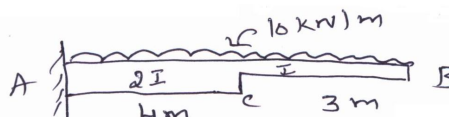
Module-3

5 a. State and prove Castigliano's theorem. **(06 Marks)**

   b. A simply supported beam AB of span 6.5m carrying the concentrated load of 46kN at 2m from A. Calculate the deflection point on load by Strain Energy method. $E = 200kN/mm^2$ and $I = 15 \times 10^{-6} \, m^4$. **(14 Marks)**

OR

6 Determine the slope and deflection at Free End of the cantilever beam shown in Fig. Q6.

(20 Marks)

Fig. Q6

Module-4

7 a. Show that the bending moment at any section of a 3 hinged parabolic arch is zero when it is loaded by a UDL throughout its span. **(10 Marks)**

   b. Show that the profile of the cable is parabolic when the cable is subjected uniformly distributed load throughout its span. Also get the expression for maximum and minimum tension and length of the cable. **(10 Marks)**

OR

8 For the three hinged parabolic arch shown in Fig. Q8. Determine the reactions at the support. Draw the bending moment diagram and find the maximum Bm and also find Nominal thrust and radial shear at a distance of 8m from the right support. **(20 Marks)**

Fig. Q8
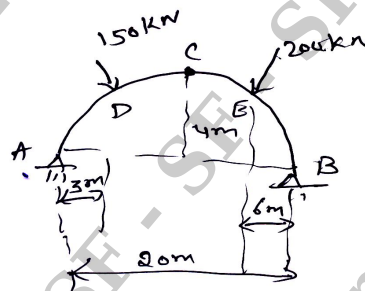
Module-5

9 a. Explain briefly Influence Line diagram. **(06 Marks)**

   b. Draw the Influence line diagram for shear force and bending moment for a section at 5m from the left hand support of a simply supported beam 20m long. Calculate the maximum bending moment and shear force at the section, due to an uniformly distributed rolling load of length 8m and intensity 10kN/m run. **(14 Marks)**

OR

10 a. What is Rolling loads and name the categories of loads on beams? **(04 Marks)**

   b. A uniform load of 40kN/m run, 6m long crossed a girder of 30m span. Calculate the maximum shear force and bending moment at section 5, 10 and 15m from the left hand support. Construct the maximum shear force. **(16 Marks)**

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