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17CV42

Fourth Semester B.E. Degree Examination, July/August 2022
Analysis of Determinate Structures

Time: 3 hrs.

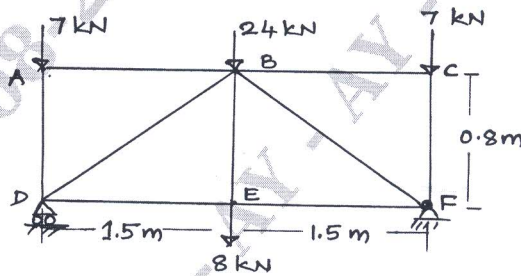
Max. Marks: 100

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

Module-1

- 1 a. Explain the different structural forms. (08 Marks)
b. Analyze the forces in all the members of the truss using method of joints as shown in Fig. Q1(b). (12 Marks)

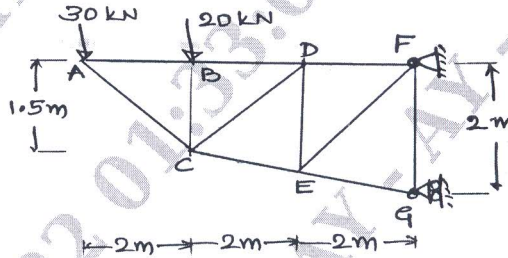
Fig. Q1(b)



OR

- 2 a. Explain the static and Kinematic Indeterminacies of structural systems. (06 Marks)
b. Explain conditions of Equilibrium and Compatibility conditions. (04 Marks)
c. Determine the forces in members CD and CE of the truss shown in Fig. Q2(c). (10 Marks)

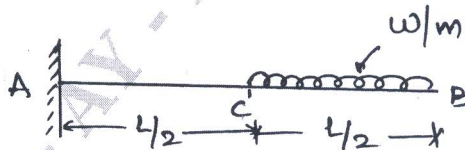
Fig. Q2(c)



Module-2

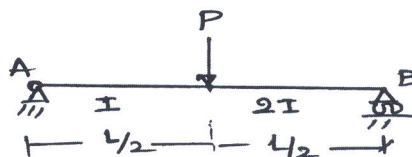
- 3 a. Determine the slope and deflection at B of a cantilever beam AB supporting a uniform load of intensity w acting over the right – half as shown in Fig. Q3(a). Use Moment Area method. (10 Marks)

Fig. Q3(a)



- b. Determine the slopes at ends and deflection at the centre of a beam shown in Fig. Q3(b) using Moment Area method. (10 Marks)

Fig. Q3(b)



Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

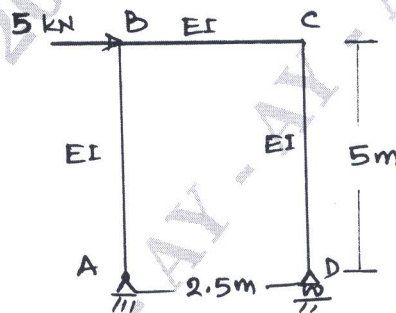
OR

- 4 a. Find the slopes at the ends and deflection at the centre of a simply supported beam with UDL over entire span using Conjugate Beam method. (08 Marks)
- b. A cantilever beam is 2m long and is required to carry a uniformly distributed load of 20 KN/m over entire length and a point load of 64 KN at the tip. Using Macaulay's method, determine the maximum deflection of the beam in terms of EI. (12 Marks)

Module-3

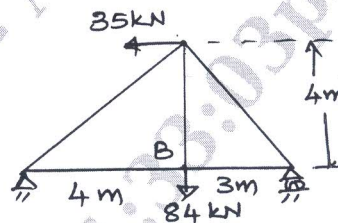
- 5 a. Find the horizontal displacement at joint B of the frame ABCD as shown in Fig. Q5(a) by Unit Load method. Assume EI to be constant for all members. (10 Marks)

Fig. Q5(a)



- b. Determine the vertical components of the deflection at joint B of the truss shown in Fig. Q5(b) by the Virtual Work method. $E = 200 \text{ GPa}$, $A = 1200 \text{ mm}^2$. (10 Marks)

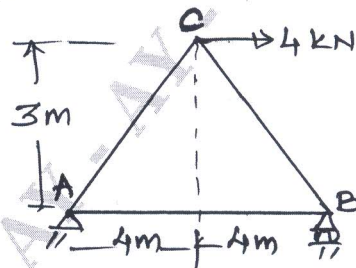
Fig. Q5(b)



OR

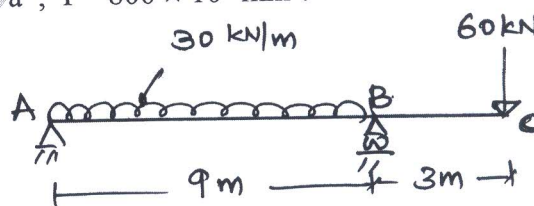
- 6 a. Determine the vertical displacement of joint C of the truss shown in Fig. Q6(a) using Castigliano's theorem. Consider $A = 400 \text{ mm}^2$ and $E = 200 \text{ GPa}$ for all members. (08 Marks)

Fig. Q6(a)



- b. Determine the deflection at point C of the beam shown in Fig. Q6(b) by Castigliano's Second theorem. $E = 200 \text{ GPa}$, $I = 800 \times 10^6 \text{ mm}^4$. (12 Marks)

Fig. Q6(b)



Module-4

- 7 a. Determine the reaction components at A and B, tension in the cable and the sag Y_B and Y_D of the cable shown in Fig. Q7(a). Neglect the self weight of the cable in the analysis.

(14 Marks)

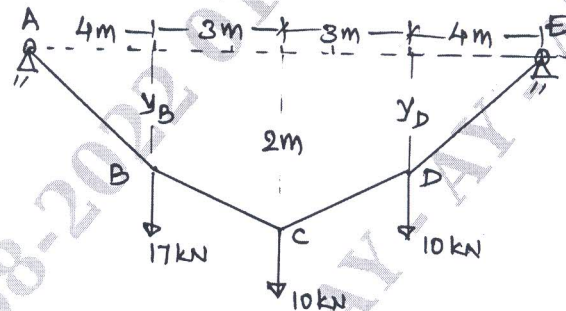


Fig. Q7(a)

- b. Determine the tension in the cables shown in Fig. Q7(b).

(06 Marks)

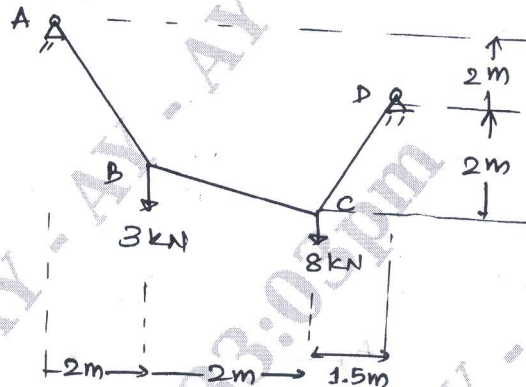


Fig. Q7(b)

OR

- 8 a. For a three – hinged parabolic arch of uniform cross section has a span of 60m and a rise of 10m. It is subjected to a uniformly distributed load of intensity 10KN/m over entire span. Show that the bending moment is zero at any cross section of the arch. (10 Marks)
- b. Determine the normal thrust, radial shear and bending moment at section D of a 3 hinged arch as shown in Fig. Q8(b). (10 Marks)

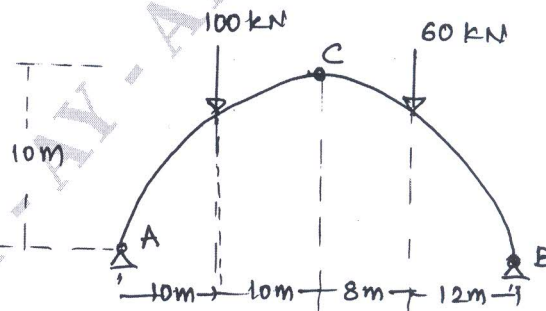


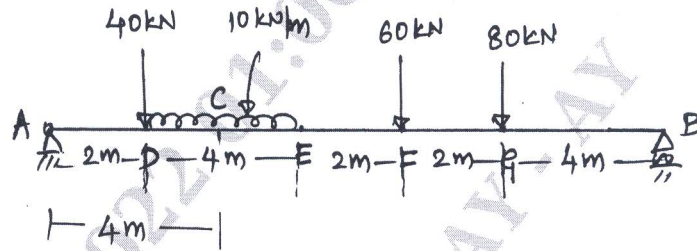
Fig. Q8(b)

Module-5

- 9 a. Draw the influence line diagram for support reactions, shear force and bending moment at a section for a simply supported beam subjected to a single point load. (08 Marks)

- b. Using influence line diagram, determine the shear force and bending moment at section 'C' in the simply supported beam shown in Fig. Q9(b). (12 Marks)

Fig. Q9(b)



OR

- 10 a. Write the application of influence line diagram in the analysis of structures. (05 Marks)
 b. Draw the influence line diagram for forces in the members $U_3 L_4$ and $U_3 U_4$ of the frame shown in Fig. 10(b). Find the maximum forces developed. When UDL of 40 kN/m, longer than the span moves from left to right on bottom chord. (15 Marks)

Fig. Q10(b)

