CBCS Scheme

USN | 1 | A | Y | 1 | 5 | C | V | 0 | 3 | 0 | 15CV42

Fourth Semester B.E. Degree Examination, June/July 2018
Analysis of Determinate Structures

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Determine the degree of static indeterminacy for the following structures [Fig.Q.1(a)]. **(08 Marks)**

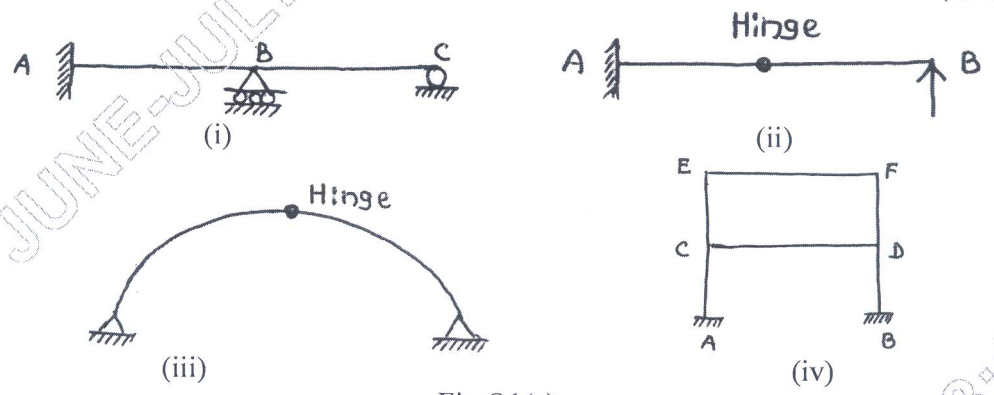

Fig.Q1(a)

b. Determine the forces in all the members of a truss shown in the Fig.Q.1(b) by method of joints and tabulate the results. **(08 Marks)**

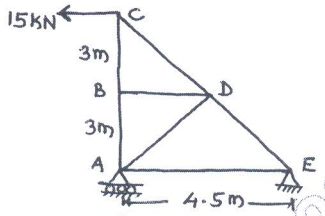

Fig.Q1(b)

OR

2 a. Differentiate between statically determinate and indeterminate structures. **(06 Marks)**

b. State the assumptions made in the analysis of truss. **(02 Marks)**

c. A truss of span 9m is loaded as shown in Fig.Q.2(c). Find the forces in the members marked 1, 2 and 3. **(08 Marks)**

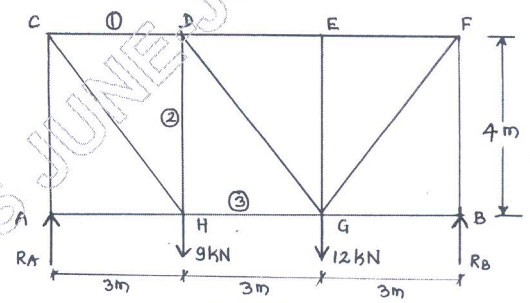

Fig.Q.2(c)

Module-2

3 a. Determine the slope at supports and maximum deflection of a simply supported beam subjected to UDL throughout the span 'L'. Use Double Integration Method. **(08 Marks)**

b. A cantilever of length 2m carries a point load of 20kN at the free end and another load of 20kN at its centre. If $E = 10^5 N/mm^2$ and $I = 10^8 mm^4$ for the cantilever, then determine by moment-area method, the slope and deflection at the free end. Refer Fig.Q.3(b). **(08 Marks)**

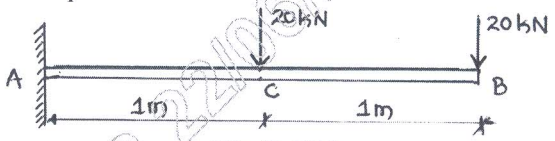

Fig.Q.3(b)

OR

4 a. Compute the deflection under concentrated load for the beam shown in Fig.Q.4(a) by using Macaulay's method. **(08 Marks)**

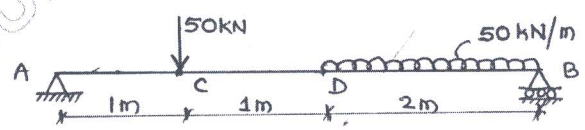

Fig.Q.4(a)

b. A cantilever beam AB of length 2m is carrying a point load 10kN at 'B'. The moment of inertia for the right half of the cantilever is $10^8 mm^4$ where as that for the left half is 2×10^8 mm^4. If $E = 2 \times 10^8$ kN/m^2, find the slope and deflection at the free end of the cantilever. Refer Fig.Q.4(b). Use Conjugate Beam Method. **(08 Marks)**

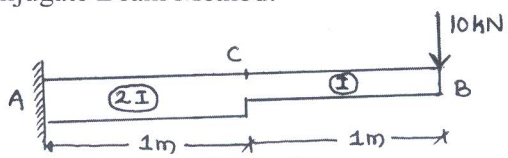

Fig.Q.4(b)

Module-3

5 a. Derive the expression for the strain energy stored in a beam due to flexure. **(06 Marks)**

b. Determine the vertical deflection at 'C' in the frame shown in Fig.Q.5(b). Take $E = 200 \times 10^6$ kN/m^2 and $I = 3 \times 10^7$ mm^4. Use Strain – Energy method. **(10 Marks)**

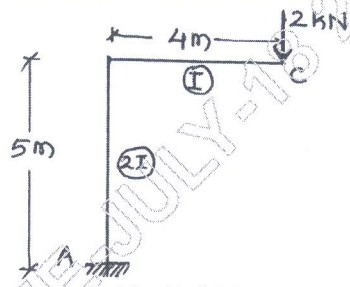

Fig.Q.5(b)

OR

6 a. Find the central deflection of a simply supported beam carrying a point load at mid span shown in Fig.Q.6(a) by using Unit Load method. **(06 Marks)**

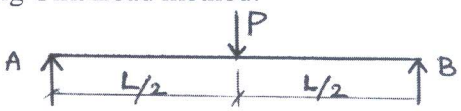

Fig.Q.6(a)

b. The cross-sectional area of the members is as indicated in Fig.Q.6(b). Using Strain – Energy method, find the strain energy stored due to loading. Take E = 200 kN/m^2. **(10 Marks)**

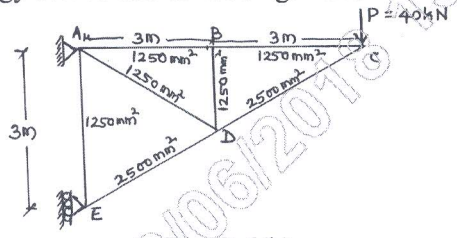

Fig.Q.6(b)

Module-4

7 a. A three hinged parabolic arch hinged at the springing and crown points has a span of 40m and central rise of 8m. It carries a UDL of 20kN/m over the left half of the span together with a concentrated load of 100kN at the right quarter span point. (Centre of right span). Find the reactions at the supports, normal thrust and radial shear at a section 10m from left support. **(08 Marks)**

b. A cable of span 20m and dip 4m carries a UDL of 20kN/m over the whole span. Find: i) Maximum tension in the cable; ii) Minimum tension in the cable; iii) The length of the cable. **(08 Marks)**

OR

8 a. A three hinged parabolic arch of span 20m and central rise of 5m carries a point load of 200kN at 6m from left hand support as shown in Fig.Q.8(a).

i) Find the reaction at the supports A and B.

ii) Draw the bending moment diagram for the arch and indicate the position of maximum bending moment. **(10 Marks)**

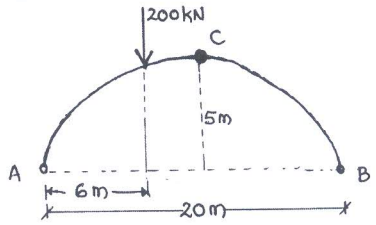

Fig.Q.8(a)

b A cable, supported on piers 80m apart at the same level, has a central dip of 8m. Calculate the maximum tension in the cable, when it is subjected to UDL of 30kN/m throughout the length. Also determine the vertical force on the piers, if the back stay is inclined at 60° to the vertical and cable passes over a pulley. **(06 Marks)**

Module-5

9 a. Define a Influence line diagram. What are the uses of ILD? **(06 Marks)**

b. Determine the reaction R_A by using ILD (influence line diagram) for beam loaded as shown in Fig.Q.9(b). **(10 Marks)**

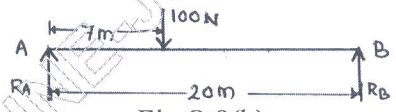

Fig.Q.9(b)

OR

10 a. Draw the influence line diagram for shear force at a section for a simply supported beam subjected to single point load. **(06 Marks)**

b. Draw the ILD for shear force and bending moment for a section 5m from left end of a simply supported beam 20m long. Hence calculate the maximum SF and maximum BM at the section due to an UDL of length 8m and intensity 10kN/m. **(10 Marks)**

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