CBCS SCHEME

USN | | | | | | | | | | |

18CV42

Fourth Semester B.E. Degree Examination, July/August 2021
Analysis of Determinate Structures

Time: 3 hrs. Max. Marks: 100

Note: *1. Answer any FIVE full questions.*
2. Assume any missing data suitably.

1 a. Differentiate between statically determinate and indeterminate beams with an example for each. **(10 Marks)**

b. Determine static and kinematic indeterminacy for the following structures shown in Fig.Q.1(b) (i), (ii), (iii), (iv), (v): **(10 Marks)**

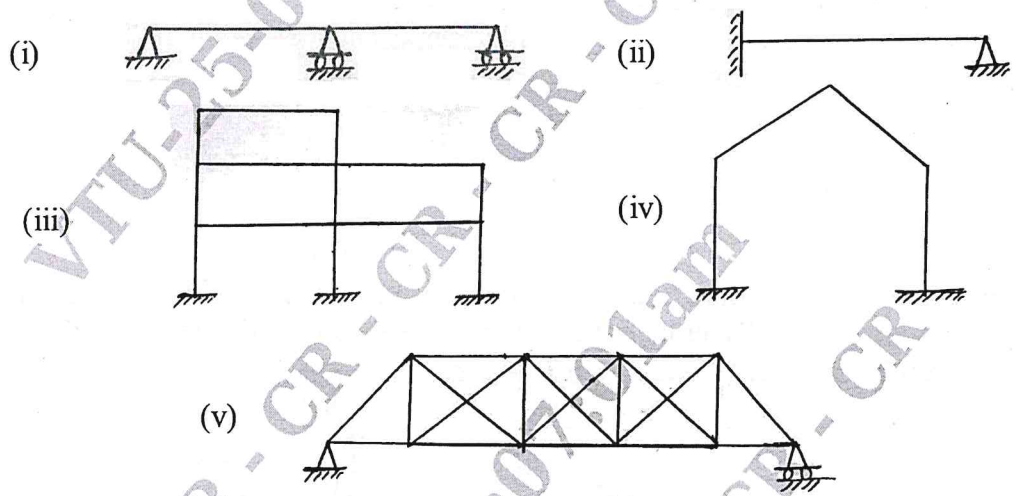

Fig.Q.1(b)

2 a. Define influence line diagram, what are the uses of ILD. **(06 Marks)**

b. A simply supported beam of span 6m is traversed by a UDL of 8m long with intensity 15kN/m^2. Draw the influence line diagram for

i) Reaction at left support.
ii) Shear force at 2m from left support.
iii) B.M at 2m from left support.

Find the maximum values of above quantities. **(14 Marks)**

3 Determine the maximum shear force and moment at section 'C' for the beam shown in Fig.Q.3. The beam is traversed by UDL of intensity 20kN/m extended over a length of 4m. Find the absolute maximum shear and maximum moment. **(20 Marks)**

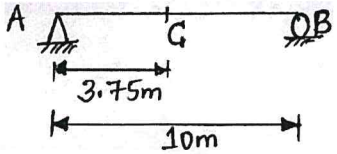

Fig.Q.3

4 A simply supported beam shown in Fig.Q.4 is subjected to a set of four concentrated loads which move from left to right. Determine: i) Maximum bending moment and shear force at a section of 6m from left support ii) Absolute maximum shear force and absolute maximum bending moment. **(20 Marks)**

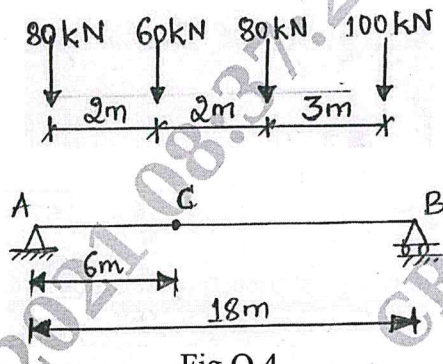

Fig.Q.4

5 a. Determine the maximum slope and deflection for the beam loaded as shown in Fig.Q.5(a). Also compute numerical values of slope and deflection if W = 100kN, span l = 10m, $E = 2 \times 10^5 N/mm^2$, $I = 50 \times 10^7 mm^4$. **(10 Marks)**

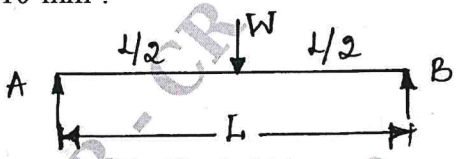

Fig.Q.5(a)

b. A simply supported beam of span 10m carries a central concentrated load of 80kN as shown in Fig.Q.5(b). Determine the maximum slope and deflection by moment area method. Take $E = 2 \times 10^5 N/mm^2$ and $I = 50 \times 10^7 mm^4$. **(10 Marks)**

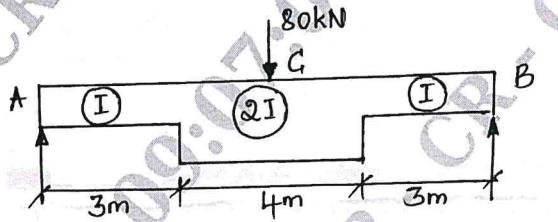

Fig.Q.5(b)

6 a. Determine the deflection under load point for the beam shown in Fig.Q.6(a) using conjugate beam method. Take $EI = 10^9 kN/cm^2$. **(10 Marks)**

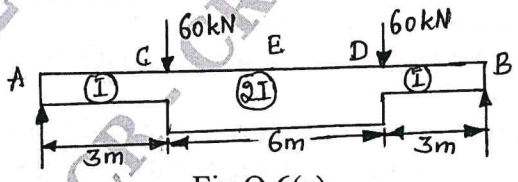

Fig.Q.6(a)

b. List the properties of conjugate beam, also find the slope and deflection at the free end of cantilever beam shown in Fig.Q.6(b). Assume constant EI. Use conjugate beam method. **(10 Marks)**

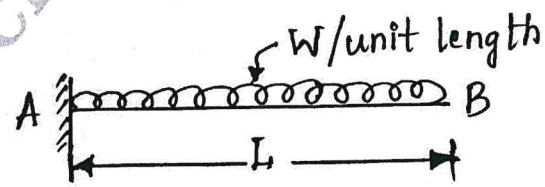

Fig.Q.6(b)

7 a. Derive the expression for strain energy due to bending moment. **(08 Marks)**

b. Determine the vertical deflection under point load as shown in Fig.Q.7(b) using strain energy method. Take $E = 200kN/mm^2$, $I = 30 \times 10^6 mm^4$. **(12 Marks)**

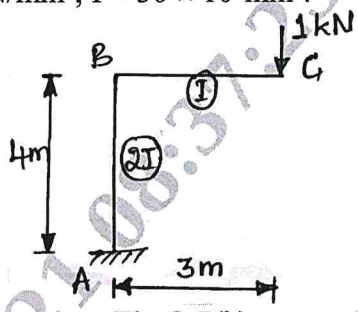

Fig.Q.7(b)

8 a. Find the deflection under the concentrated load for the beam shown in Fig.Q.8(a) by using Castiglino's theorem. Take $E = 2 \times 10^8 kN/m^2$ and $I = 14 \times 10^{-6} m^4$. **(10 Marks)**

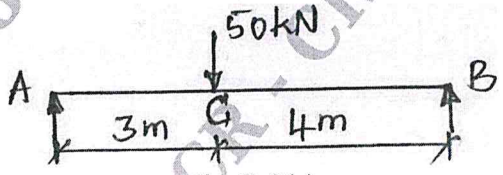

Fig.Q.8(a)

b. Determine the slope and deflection at free end of cantilever by using unit load method take $E = 2 \times 10^5 N/mm^2$ and $I = 12 \times 10^6 mm^4$. Refer Fig.Q.8(b). **(10 Marks)**

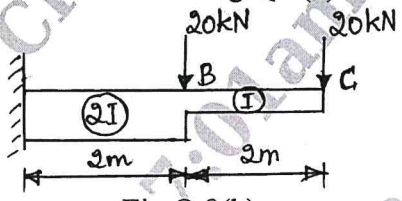

Fig.Q.8(b)

9 a. A three hinged parabolic arch of span 20m and rise 4m carries a UDL of 20kN/m run on the left half of the span find the maximum BM for the arch and also determine normal thrust and radial shear at a point 5m from left support. **(10 Marks)**

b. A cable of uniform section is suspended between two points/supports 100m apart. It carries a UDL of 10kN/m spread over the horizontal span. The lowest point of the cable sag 10m below the support. Find:

i) Maximum and minimum tension in the cable

ii) Length of the cable

iii) Minimum cross sectional area of the cable if allowable stress is 280MPa. **(10 Marks)**

10 A three hinged parabolic arch has a horizontal span of 20m and a central rise of 4m. It carries a UDL of 30kN/m over a length of 4m from crown towards the left. In addition it carries a point load of 80kN at 4m from the right support. Determine the B.M in the arch. Also determine the normal thrust and radial shear at a section which lies at 6m from the right support. Also draw B.M.D. **(20 Marks)**

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