

CBCS SCHEME

17CV42

Fourth Semester B.E. Degree Examination, June/July 2019 Analysis of Determinate Structures

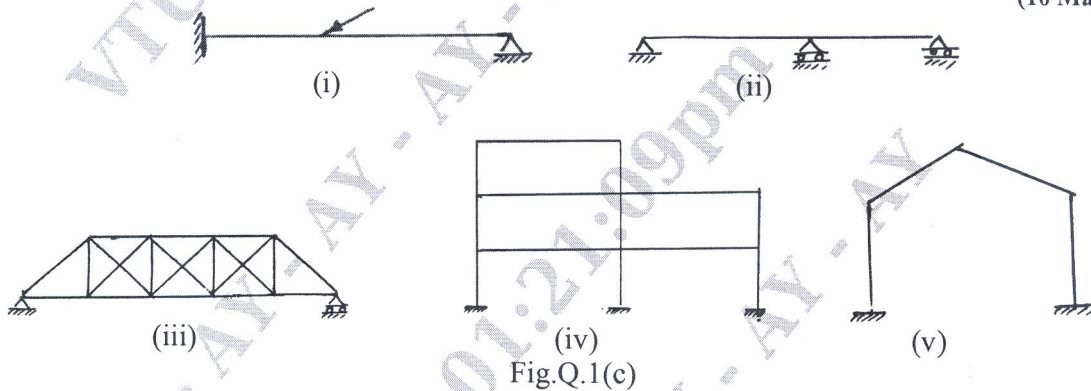
Time: 3 hrs.

Max. Marks: 100

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

Module-1

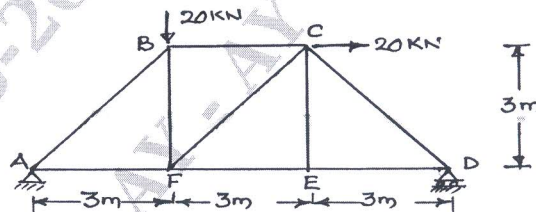
- 1 a. Differentiate between statically determinate and indeterminate beams with an example for each. (06 Marks)
- b. Define degree of freedom. What is the degree of freedom for a i) Fixed support (04 Marks)
ii) Hinged support.
- c. Determine static and kinematic indeterminacy for the following shown in Fig.Q.1(c). (10 Marks)



OR

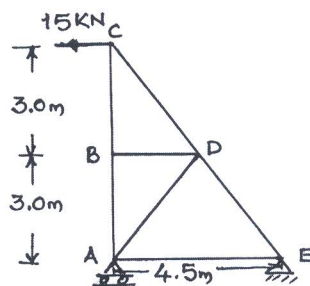
- 2 a. Determine the forces in all the members of the truss shown in Fig.Q.2(a) use the method of joints. (12 Marks)

Fig.Q.2(a)



- b. Determine the forces in all the members of the truss shown in Fig.Q.2(b) by the method of section. (08 Marks)

Fig.Q.2(b)



1 of 3

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.

Module-2

- 3 a. Derive moment curvature equation for deflection. (04 Marks)
 b. Determine the slope and deflection at free end of a cantilever beam subjected to point load 'W' at free end and of span 'L' with constant EI use Maculay's method. (08 Marks)
 c. Using Conjugate beam method Determine the maximum deflection and slopes at support for a simply supported beam subjected to udl of w/m run over a span of L m with constant EI. (08 Marks)

OR

- 4 a. Determine the slope at left support and deflection at mid span of simply supported beam subjected to the loads as shown in Fig.Q.4(a) by using Maculay's method take $EI = 200\text{MN}\cdot\text{m}^2$. (10 Marks)
 b. Determine the slope at A and deflection at mid span for the above beam shown in Fig.Q.4(b) by using moment area method $EI = 200\text{MN}\cdot\text{m}^2$. (10 Marks)

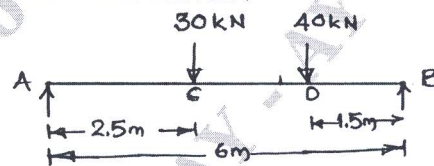


Fig.Q.4(b)

Module-3

- 5 a. Obtain an expression for strain energy stored in a member when it is subjected to bending moment. (06 Marks)
 b. Find the deflection at C due to a point load acting as shown in Fig.Q.5(b) by using strain energy method. (06 Marks)

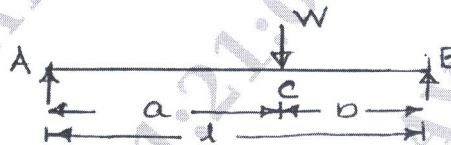
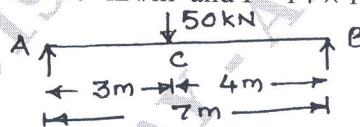


Fig.Q.5(b)

- c. Find the deflection under the concentrated load for the beam shown in Fig.Q.5(c), by using Castiglino's theorem. Take $E = 2 \times 10^8\text{ kN/m}^2$ and $I = 14 \times 10^{-6}\text{ m}^4$. (08 Marks)



OR

- 6 a. Determine the horizontal and vertical deflection at the free end of bracket shown in Fig.Q.6(a). (10 Marks)

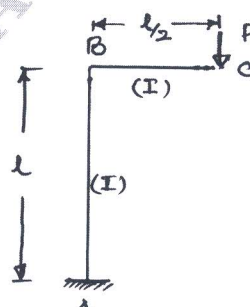
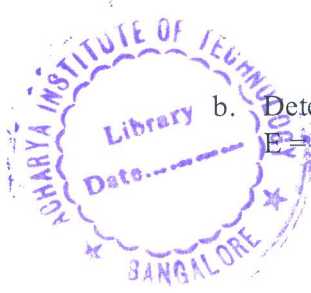


Fig.Q.6(a)



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

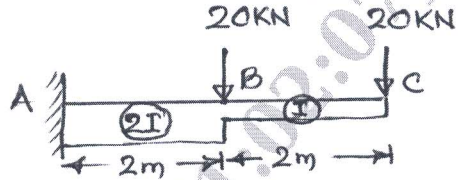


Fig.Q.6(b)

Module-4

- 7 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. Show that the shape of cable is parabolic when the supports are at the same level and is subjected to udl of w force/unit length over the entire span also find the length of the cable. (10 Marks)

OR

- 8 a. A cable of span 20m and central 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) Length of cable iv) Horizontal and vertical forces transmitted on to the supporting pier if the cable passed over a smooth frictionless pulley. (10 Marks)
- b. Show that the parabolic shape is a funicular shape for a three hinged arch subjected to udl over its entire span. (10 Marks)

Module-5

- 9 a. Define influence line diagram, what are the uses of ILD? (04 Marks)
- b. A simple girder of 20m span is traversed by a moving udl of length 6m with an intensity of 20kN/m from left to right. Find the maximum bending moment and maximum positive and negative shear force at section 4m from left support also find the absolute maximum bending moment that may occur any where in the girder. [Ref.Fig.Q.9(b)] (16 Marks)

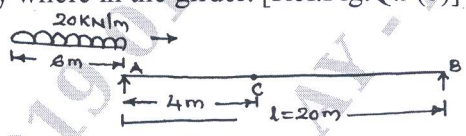


Fig.Q.9(b)

OR

- 10 a. Draw the unit load influence line diagrams for the reactions at supports of a simply supported beam. (04 Marks)
- b. A simply supported beam shown in Fig.Q.10(b) is subjected 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. Use influence line principle. (16 Marks)

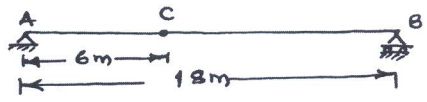
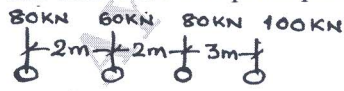


Fig.Q.10(b)