

Total Pages—4

B.Tech - 4
SA - I

Set-1

Full Marks : 70

Time : 3 hours

Answer any six questions including Q. No. 1

The figures in the right-hand margin indicate marks

1. Explain the following very shortly : 2×10

- (i) Degree of freedom
- (ii) Static indeterminacy
- (iii) Kinematic indeterminacy
- (iv) Maxwell's reciprocal theorem
- (v) Flexural rigidity
- (vi) Direct stress and bending stress
- (vii) Moment of inertia
- (viii) Section modulus

(Turn Over)

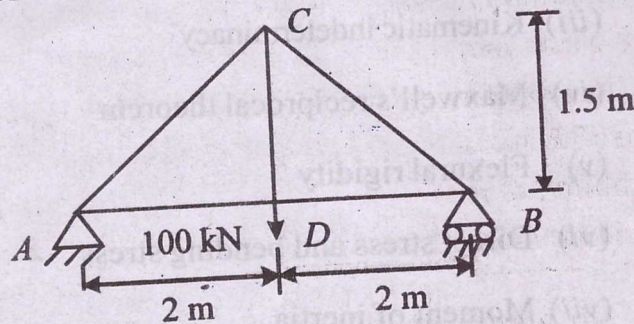
(2)

(ix) Castigliano's theorem

(x) Yield stress.

2. A simply supported beam of uniform cross-section of length $2L$ has an additional prop at the middle which deflects by λ times the load it can carry. If the total uniformly distributed load on the beam is W , find the reaction of the prop? 10

3. Find the vertical deflection of joint C for the truss shown below. All members are of uniform cross-section of 800 mm^2 . $E = 2.1 \times 10^5 \text{ N/mm}^2$ 10



4. A beam AB 6 m long is fixed at A and simply supported at B . It carries a uniformly distributed

(3)

load of 50 kN/m in the middle third of the beam.
Draw the shear force and bending moment
diagrams for the beam. 10

5. A simply supported beam AB of span 12 m carries a point load of 100 kN at point C which is 4 m from end A . The moment of inertia of the beam is I in the part BC and $2I$ in the part AC . Find the slope at end B and deflection at point C . 10

$$E = 2 \times 10^5 \text{ N/mm}^2 \quad I = 100 \times 10^7 \text{ mm}^4$$

6. A continuous beam ACB simply supported at the two ends is 8 m long, with $AC = 3\text{m}$ and $BC = 5\text{m}$. The span AC carries a load of 50 kN/m while the span BC carries a concentrated load of 120 kN at the middle of the span. Draw the bending moment diagram. 10
7. Draw the influence line diagram for bending moment and shear force for a section of a simply supported beam at a distance X from the left end. 10

(4)

8. A suspension cable in a bridge is 120 m long and has a central dip of 12 m which is stiffened by a three hinged girder. Two point loads of 250 kN and 300 kN act on it at distance of 25m and 80 m from the left end. Find the bending moment at quarter points of the girder and tension in the cable. 10