

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

I. Answer briefly :

- i) What is a conjugate beam? Discuss its utilities.
- ii) What are zero-force members? Why are they required?
- iii) Differentiate the statically determinate structures and statically indeterminate structures.
- iv) What is meant by absolute maximum bending moment in a beam?
- v) State Maxwell-Betti's theorem.
- vi) What is a linear arch?
- vii) Give a relation between actual beam and the conjugate beam when the former has a fixed end.
- viii) What is electric curve?

- ix) Find the horizontal reaction for uniformly loaded cable.
- x) What are the failures criteria of dams? What is the no tension criteria of a dam section?

SECTION-B

2. A simply supported steel beam of span 5 m carries a concentrated load of 50 kN at 3 m from the left support. The beam is of circular cross-section with the diameter of 100 mm. The modulus of elasticity of steel is 200 GPa. Find the deflection under the load using moment-area theorem.
3. Define Muller-Breslau principle. Use the principle to draw influence line for the moment at B of an overhang beam shown in Fig. 1.



Fig. 1

4. A three-hinged arch of 80 m-span and 20 m rise carries a distributed load which varies uniformly from zero at the crown to 1000 kg/m at the springing. Determine the equation of the arch axis such that it carries only normal thrust.
5. A cable is used to support six equal and equidistant loads over a span of 49 m. The central dip of the cable is 5 m and the loads are 20 kN each. Find the length of the cable required and its sectional area if the safe tensile stress is 157.4 N/mm².
6. A masonry dam 8 m high, 1.5 m wide at the top and 5 m wide at the base retains water to a depth of 7.5 m. Find the maximum and minimum stress intensities at the base. The weight of water is 9810 N/cum. The weight of masonry is 22000 N/cum.

SECTION-C

7. Solve the continuous beam shown in Fig. 2 by Castigliano's theorem. Draw the SFD and BMD for the beam.

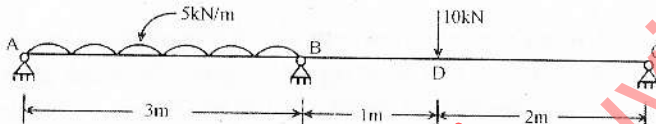


Fig. 2

8. Determine the force in each member of the truss shown in Fig. 3 by using the method of joints.

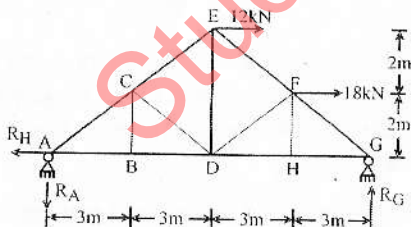


Fig. 3

9. A beam is simply supported over a span of 40 m and supports two point loads of 80 kN and 100 kN respectively and 10 m apart rolling over the span. Draw the influence lines for shear force and bending moment for a section 15 m from the left support and determine the maximum shear force and bending moment at that section.