G 1542 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2016

Fourth Semester

Branch : Civil Engineering

CE 010 403—MECHANICS OF SOLIDS–II (CE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. State moment area theorems.
2. Explain Maxwell's Reciprocal theorem.
3. What do you mean by influence line diagram ?
4. List the different types of arches.
5. Define product of inertial.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Determine the deflection and slope at quarter point of simply supported beam of span L subjected to u.d.l. w/m.
7. Explain the principle of virtual work for deformable bodies.
8. Draw the ILD for bending moment and shear force at any point of a simple supported beam.
9. Calculate the reactions at the crown of a circular arch of span 25 m. with a central rise 5 m. hinged at the crown and springing. It carries a point load of 100 kN at 6 m. from the left support.
10. State and explain Mohr's theory.

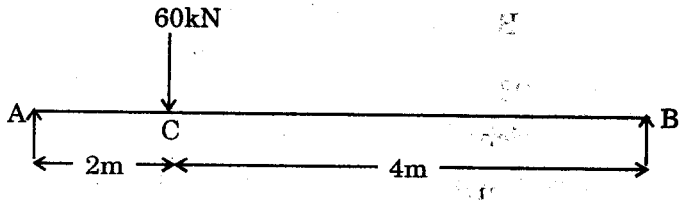
(5 × 5 = 25 marks)

Turn over

Part C

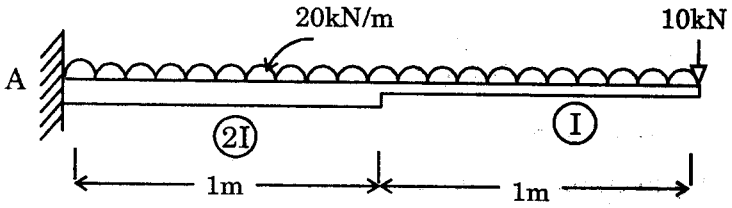
Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Determine the deflection under the concentrated load and the maximum deflection in the beam using conjugate beam method.

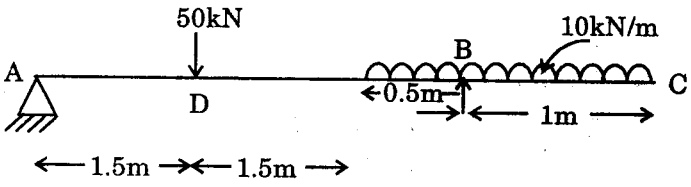


Or

12. Using conjugate beam method, determine the deflection and rotation at the free end in the beam.

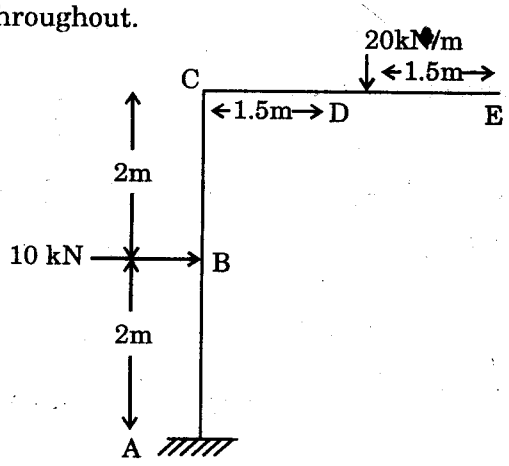


13. Determine the deflection at the free end of the overhanging beam shown in Fig. below. Assume uniform flexural rigidity.

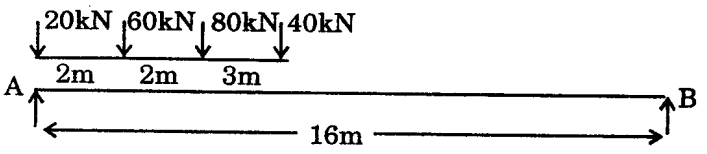


Or

14. Determine the vertical and the horizontal deflection at the free end of the bent shown in Fig. below. Assume uniform EI throughout.

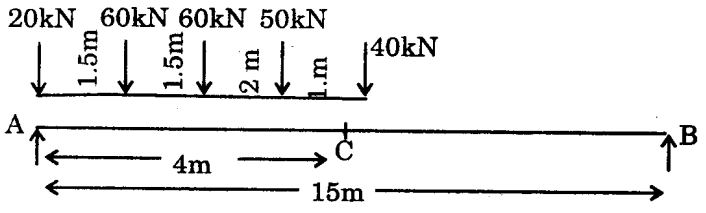


15. A train of concentrated loads shown in Fig. moves from left to right on a simply supported girdes of span 16 m. Determine the absolute maximum shear force and bending moment developed in the beam.



Or

16. The system of concentrated loads shown in Fig. rolls from left to right on the girdes of span 15 m. 40 kN load leading. For a section 4 m from left support, determine (a) Maximum bending moment and (b) Maximum shear force.



17. A symmetric three hinged parabolic arch has a urban of 30 m and a central rise of 6 m. The arch carries a distributed load of 40 kN/m. at each abutment to zero at mid-span. Determine (a) the horizontal thrust at the abutments ; (b) maximum positive bending moment in the arch.

Or

18. A suspension bridge of 120 m span has two three hinged stiffening girders supported by two cables having a central dip of 12 m. The roadway has a width of 6 m. The dead load on the bridge is 5 kN/m^2 while the live load is 10 kN/m^2 which acts on the left half of the span. Determine the shear force and bending moment in the girder at 30 m. from the left end. Find also the maximum tension in the cable for this position of live load.

19. At a certain point in a strained material the principal stresses are 1.75 f (tensile), f (tensile) and 0.60 f (compressive). Taking the elastic limit in pure tension as 235 N/mm^2, find the 'f' value according to failure theories. Take 1/m = 0.25.

Or

20. A bolt is subjected to an axial pull of 18 kN and a transverse shear force of 9 kN. Find the diameter of the bolt by various theories taking the elastic limit in tension equal to 225 N/mm^2. Take Poisson's ratio = 0.25 and factor of safety = 2.

(5 × 12 = 60 marks)