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Q 2121

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Sixth Semester

Civil Engineering

CE 336 — STRUCTURAL ANALYSIS — II

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Muller Breslau's principle.

2. What is the advantage of influence line diagrams?

3. List the different types of arches.

4. Give the expressions for finding rise at any point 'x' for a parabolic arch and a circular arch.

5. How will you find maximum tension in a cable?

6. Sketch a typical suspension cable with three hinged stiffening girder.

7. State the practical situations where beams curved in plan are used.

8. Where do you use space trusses?

9. How will you obtain plastic section modulus?

10. Where do plastic hinges occur and how will you obtain the number of plastic hinges?

PART B — (5 × 16 = 80 marks)

11. (a) A simply supported beam of span 8 m is subjected to two point loads of 15 kN and 20 kN at 2 m and 4 m from left end. Also, it is subjected to a uniformly distributed load of 15 kN/m of length 2.5 m commencing from 5 m from left end. Using influence line diagrams, determine the reactions, shear force at 3 m and at 5.5 m and bending moment at centre of span and at 6 m from left end.

Or

(b) A two span continuous beam ABC has spans AB = 6 m and BC = 8 m. Construct the influence line diagram for reaction at left support and influence line diagram for bending moment at support B. Compute influence line diagram ordinates at 1 m intervals.

12. (a) A 3 hinged parabolic arch of span 12 m and a central rise of 3 m carries a uniformly distributed load of 25 kN/m over the left half of the span. Calculate the values of normal thrust, shear force and bending moment at 2 m and 7 m from left hand hinge.

Or

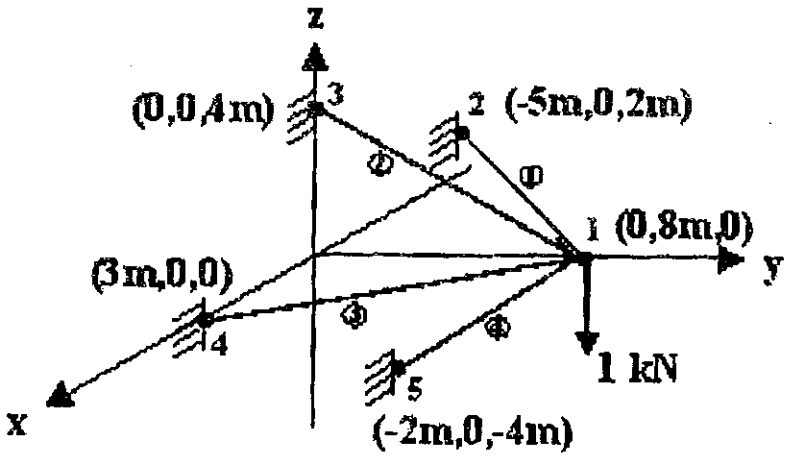
(b) A three hinged parabolic arch of 20 m span and 4 m central rise carries a point load of 5 kN at 4 m horizontaly from the left hand hinge. Calculate the normal thrust and shear force at the section under the load. Also, calculate the maximum positive and negative bending moment.

13. (a) The cables of a suspension bridge of 100 m span are suspended from piers which are 12 m and 6 m respectively above the lowest point of the cable. The load carried by each cable is 2 kN/m of span. Determine (i) the length of the cable between the piers (ii) the horizontal pull in the cable (iii) tension in the cable at the piers (iv) the pressure on the piers assuming that the cable pass over smooth pulleys fixed to the top of piers and that the back stay at the lowest pier makes an angle of 60° with the vertical and that higher pier makes an angle of 45° with the vertical.

Or

(b) A suspension cable, stiffened with a three hinged girder has 100 m span and 10 m dip. The girder carries a load of 0.5 kN/m. A live load of 15 kN rolls from left to right. Determine (i) the maximum bending moment anywhere in the girder (derive the formula used) and (ii) the maximum tension in the cable.

14. (a) Analyse the space truss shown in Fig. 1 by the method of tension coefficients.



All rods: E = 70 GPa, A = 4 cm²

Fig. 1 Qn. 14 (a)

Or

(b) Derive the governing equation for analysis of beams curved in plan. Draw a typical section of a beam and indicate the parameters.

15. (a) (i) Determine the shape factor for a T-section of flange 150 mm × 10 mm and web of size 10 mm × 200 mm. (8)

(ii) Determine from basic principles the fully plastic moment of a propped cantilever subjected to uniformly distributed load over the entire span. (8)

Or

(b) (i) Derive the shape factors for a rectangular section and a triangular section. (8)

(ii) Determine the fully plastic moment of a fixed beam subjected to uniformly distributed load over left half of the span. (8)