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10CV43

# Fourth Semester B.E. Degree Examination, June/July 2016
## Structural Analysis – I

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer FIVE full questions, selecting at least TWO questions from each part.***



### PART – A

1 a. Explain static indeterminacy and kinematic indeterminacy of structures with examples. **(06 Marks)**

b. Derive an expression for strain energy stored in a beam due to bending with usual notations. **(08 Marks)**

c. Explain any three structural forms with examples. **(06 Marks)**

2 a. Determine the slope and deflection at the free end of the cantilever beam of span $\ell$ subjected to udl of intensity $\omega$/unit length throughout the span. EI is constant. Use moment area theorem. **(08 Marks)**

b. Find the slope at support A and deflection at centre span of a simply supported beam subjected to loading as shown in Fig.Q2(b). Use conjugate beam method. E is constant.

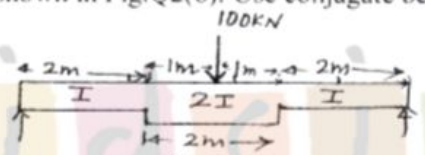


Fig.Q2(b) **(12 Marks)**

3 Find the vertical deflection at the joint C for the pin jointed truss shown in Fig.Q3, by strain energy method. The cross sectional area is shown. Take E = 200 kN/mm$^2$.

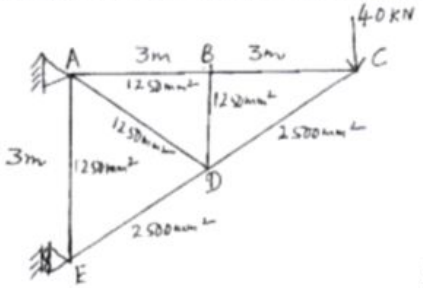


Fig.Q3 **(20 Marks)**

4 a. Determine horizontal and vertical component of deflection at point 'C' for the frame loaded as shown in Fig.Q4 by strain energy method.

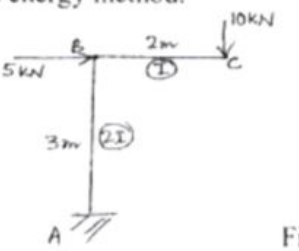


Fig.Q4 **(14 Marks)**

b. Using strain energy method, compute the deflection at mid span of a simply supported beam carrying a uniformly distributed load of $\omega$ kN/m. Assume an uniform flexural rigidity. **(06 Marks)**

## PART – B

5 a. Derive an expression to find length of a cable subjected to uniformly distributed load throughout with usual notations. **(08 Marks)**

b. A three hinged parabolic arch is loaded as shown in Fig.Q5(b). Determine the reactions at supports, normal thrust, radial shear and bending moment at left quarter span point.

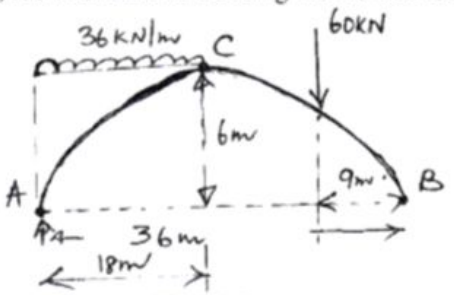


Fig.Q5(b) **(12 Marks)**

6 a. Draw SFD and BMD for the propped cantilever beam loaded as shown in Fig.Q6(a). Use consistent deformation method.

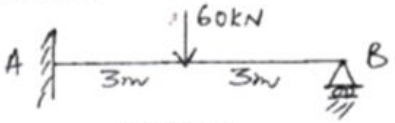


Fig.Q6(a) **(08 Marks)**

b. For a rigidly fixed beam AB of span 5m carrying a uniformly distributed load of 10 kN/m over the entire span, locate the point of contra flexure and draw BMD and SFD. [Fig.Q6(b)], carryout complete analysis using consistent deformation method.

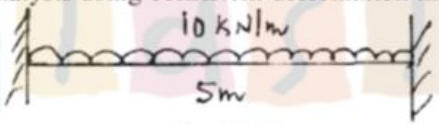


Fig.Q6(b) **(12 Marks)**

7 Analyze the continuous beam shown in Fig.Q7, by three moment theorem. E is constant. Draw the BMD and SFD.

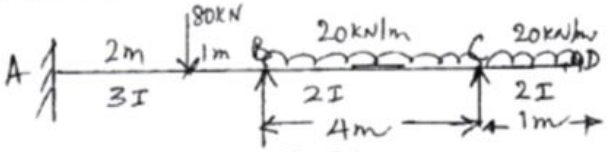


Fig.Q7 **(20 Marks)**

8 A two hinged parabolic arch of constant cross-section has a span of 60 m and a central rise of 10 m. It is subjected to loading as shown in Fig.Q8. Calculate the reactions at supports of the arch, normal thrust and radial shear at 20 m from left support.

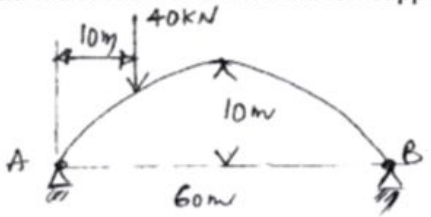


Fig.Q8 **(20 Marks)**

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