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Question Paper Code : 71585

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Sixth Semester

Civil Engineering

CE 6602 – STRUCTURAL ANALYSIS – II

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write down the equation for the degree of static indeterminacy of the pin jointed Plane frames, explaining the notations used.

2. Define kinematic redundancy.

3. Why is the stiffness matrix method also called equilibrium method?

4. Derive the stiffness matrix of a typical pin-jointed two–dimensional frame element.

5. Classify the elements used in FEM.

6. Compose the plane stress condition.

7. Define collapse load.

8. Compose upper bound theory.

9. List out the main functions of stiffening girders in suspension bridges.

10. Compose the expression for determining the tension in the cable.

PART B — (5 × 16 = 80 marks)

11. (a) Analyse the continuous beam ABC shown in Fig Q. 11 (a) by flexibility matrix method and draw the bending moment diagram.

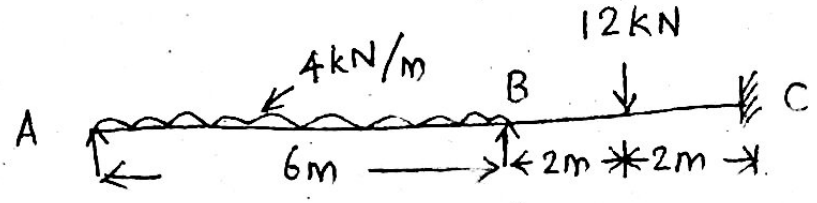

Fig Q. 11 (a)

Or

(b) Examine the moment of portal frame ABCD shown in Fig Q. 11 (b) using by flexibility matrix method.

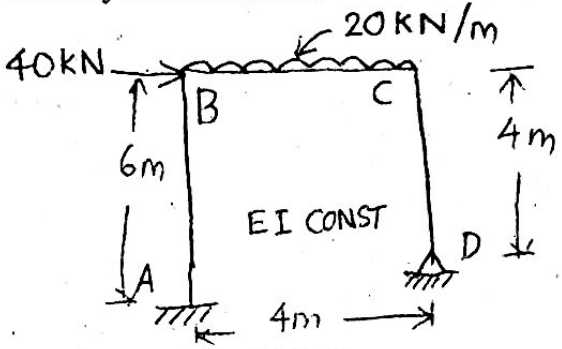

Fig Q. 11 (b)

12. (a) Analyse the portal frame ABCD shown in Fig Q. 12 (a) by stiffness method and also sketch the bending moment diagram.

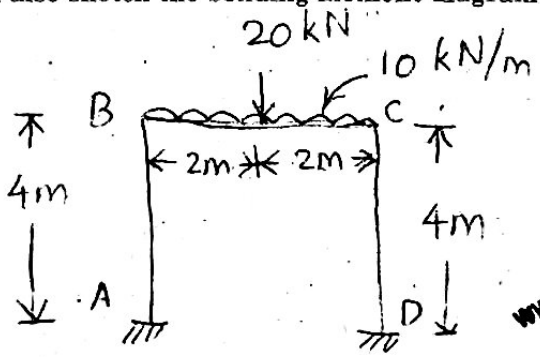

Fig Q. 12 (a)

Or

(b) Analyse the continuous beam shown in Fig Q. 12 (b) stiffness method. Draw the bending moment diagram.

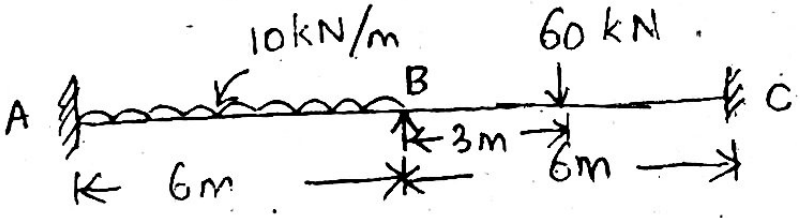

Fig Q. 12 (b)

13. (a) Derive the element strain displacement matrix of a triangle element.

Or

(b) Compose the shape functions for cubic element. Shape functions should be specified in both natural and global coordinate systems.

14. (a) Analyse the shape factor of the I-section with top flange 100mm wide, bottom flange 150mm wide, 20mm thick and web depth 150 mm and web thickness 20mm.

Or

(b) A two span continuous beam ABC has span length AB=6m and BC=6m and carries an udl of 30 kN/m completely covering the spans AB and BC. A and C are simple supports. If the load factor is 1.8 and the shape factor is 1.15 for the I-section, Evaluate the section modulus, assume yield stress for the material as 250 N/mm^2.

15. (a) Diagram fig. Q.15 (a) shows a curved beam, semi-circular in plan and supported on three equally spaced supports. The beam carries a uniformly distributed load of w/unit of the circular length. Analyse the beam and sketch the bending moment and twisting moment diagrams.

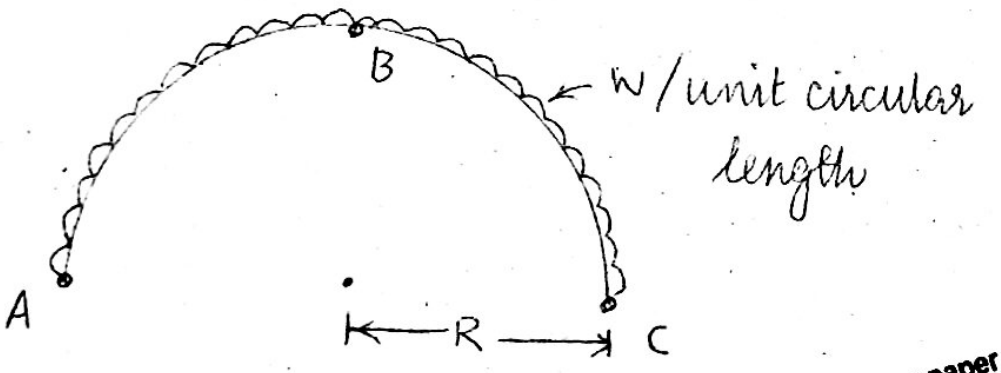

Fig. Q. 15 (a)

Or

(b) A suspension cable of 80m horizontal span and central dip 8m has a stiffening girder hinged at both ends. The dead load transmitted to the cable including its own weight is 1600kN. The girder carries a live load of 30kN/m uniformly distributed over the left half of the span. Assuming the girder to be rigid, Assess the shear force and bending moment in the girder at 20m from the left support. Also assess the maximum tension in the cable.
