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Question Paper Code : 70358

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Sixth Semester

Civil Engineering

CE 8602 – STRUCTURAL ANALYSIS II

(Regulations – 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by absolute shear force diagram?
2. State the location of maximum shear force in a simple beam with any kind of loading.
3. State the importance of Muller Breslau principle.
4. What is meant by absolute maximum bending moment in a beam?
5. Show the positions of a moving point load for maximum negative and positive Bending moments in a three hinged arch.
6. Differentiate three hinged and two hinged arches.
7. What are the main functions of stiffening girders in suspension bridges?
8. State about the dip of the cable.
9. Differentiate between plastic hinge and mechanical hinge.
10. Define shape factor.

PART B — (5 × 13 = 65 marks)

11. (a) A simply supported beam of span 8m loaded on show in figure find the shear force and BM at a section 4m from the left ness. Draw ILD for support reaction, SF and BM. (13)

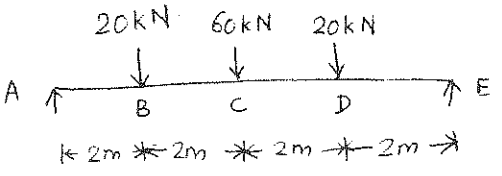

Fig. Q11(a)

Or

(b) Determine the vertical deflection of point C in the truss shown in figure. The cross sectional area of members AD and DE are 1500 mm² while those of other members are 1000 mm². Take E = 200 GPa. (13)

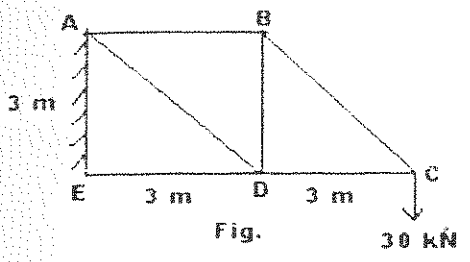

Fig. Q11(b)

12. (a) Draw the ILD for the propped cantilever reaction of a propped cantilever beam having span 6nt EI is constant. (13)

Or

(b) Draw the influence line for M_B for the continuous beam ABC of span AB = BC = 4 m Simply supported at A,B and C. Compute the ordinates at every 1m interval, EI = constant. (13)

13. (a) A two hinged parabolic arch of span Land rise h carries a triangular load covering a distance a from the left end, the intensity varying uniformly from zero to W. Discuss and obtain an expression for the horizontal thrust. (13)

Or

(b) Formulate the expression for horizontal thrust in a two hinged of radius R, carrying a point load W at the crown. (13)

14. (a) A suspension bridge has a span 50 m with a 15 m wide runway. It is subjected to a load of 30 kN/m including self-weight. The bridge is supported by a pair of cables having a central dip of 4 m. find the cross sectional area of the cable necessary if the maximum permissible stress in the cable materials is not to exceed 600 MPa. (13)

Or

(b) A suspension cable has a span of 120 m and a central dip of 10 m and is suspended from the same level at both towers. The bridge is stiffened by a stiffening girder hinged at the end supports. The girder carries a single concentrated load of 100 kN at a point 30 m from left end. Assuming equal tension in the suspension hangers. Calculate the horizontal tension in the cable and the maximum positive bending moment. (13)

15. (a) Analyse the shape factor of the 1-section with top flange 100 mm wide, bottom flange 150mm wide, 20mm thick and web depth 150 mm and web thickness 20 mm. (13)

Or

(b) A three span continuous beam ABCD has the span lengths of AB=BC=CD=8 and carries an udl of 40kN/m completely covering the spans and A and D are simply supported ends. If the load factor is 1.5 and Shape factor is 1.15 for the "T" section, Find the section modulus needed. Assume the yield stress for the material as 300 N/mm^2. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Derive the expression for bending moment and torsion for a semicircular beam of radius R. The cross section of the material is circular with radius r. It is loaded with a load at the midpoint of the semicircle. (15)

Or

(b) Find the collapse load for the from shown in Fig Q.16(b). (15)

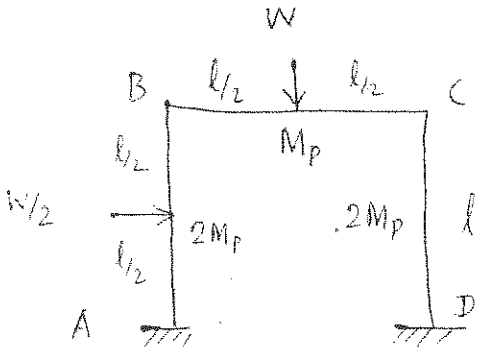

Fig. 16(b)