Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 20335

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

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 the Influence lines?
2. Define absolute maximum bending moment.
3. Construct the influence lines for shear at "L/3" from the left support of a simple beam of span "L".
4. What is Begg's deformeter?
5. Distinguish between a true arch and a corbelled arch.
6. What are the different forms of arches?
7. What is a cable structure? How is it different from an arch?
8. List the components of a suspension bridge.
9. Determine the shape factor for a right-angle triangle section.
10. Write any two assumptions of the plastic theory.

PART B — (5 × 13 = 65 marks)

11. (a) An UDL of length 2.5 m and intensity 25 kN/m rolls across a girder of span 9.5 m as shown in figure Q.11(a) below. Calculate the maximum negative and positive shear force, and maximum bending moment at a section 4.5 m from left support.

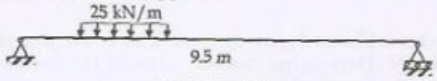

Fig Q.11(a)

Or

(b) Determine the absolute maximum left and right reactions for a simple beam of 15 m span with a series of loads as shown in figure Q.11(b) below.

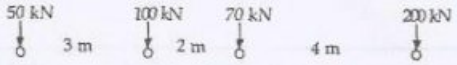

Fig Q.11(b)

12. (a) Consider a two span continuous beam ABC with simple supports (Span AB=BC=4m). Construct the influence line for shear at mid-point of span AB if the beam carries an UDL of 10 kN/m, and the UDL can occupy a single span fully or a portion of a span. Assume "*EI*" as constant.

Or

(b) A propped cantilever beam fixed at A and hinged at B has a span of 6 m. Determine the reaction at B, shear and moment at 2 m from A using influence diagram when an UDL of 25 kN/m is applied on the beam on its full span or on a part of it.

13. (a) Find out the thrust in a two-hinged parabolic arch of rise 10 m and span 60m subjected to an UDL of 25 kN/m. The moment of inertia at the crown section is 1.14×10^{-3} m^4 and the area of the cross section is 6.75×10^{-2} m^2. Write the bending moment expression at any section at a distance "*x*' from the crown, and determine the bending moment at the crown.

Or

(b) A three-hinged segmental arch has a span of 40 m and a rise of 7 m. It is subjected to a point load of 80 kN acting at 10 m from the right support. Find

(i) the horizontal thrust and vertical reactions at supports, and

(ii) normal thrust, radial shear, and bending moment at 10 m from the left support.

14. (a) Determine the length of a cable which is subjected to four equally spaced identical loads of 10 kN each if the span is 10 m and maximum sag is 3 m. Also find the maximum tensile force in the cable.

Or

(b) A flexible suspension cable of weight 1.5 kN/m hangs between two vertical walls 40 m apart, the left end being attached to the wall at a point 7.5 m below the right end of the cable. Calculate the tension at both ends. The cable weight may be taken to act uniformly distributed horizontally.

15. (a) Determine the shape factor of the I-section with the following details. Top flange is 120 × 10 mm, bottom flange is 150 × 20 mm, and web is 15 × 470 mm.

Or

(b) A propped cantilever beam of span 4 m is subjected to a mid-span point load of 40 kN. Determine the sequence of the formation of plastic hinges and the load at each stage. Also find the plastic moment capacity of the beam by taking a load factor of 2.25.

PART C — (1 × 15 = 15 marks)

16. (a) A three-hinged semicircular arch of radius "*R*" carries a uniformly distributed load of "*w*" per unit run over the whole span. Find the horizontal thrust at each support, and the location and magnitude of the maximum bending moment for the arch.

Or

(b) A beam of span 6 m is fixed at both ends and carries a uniformly distributed load of 100 kN/m over the left half of the span. Determine the plastic moment.

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