

409

Register No.:

November 2022

Time – Three hours
(Maximum Marks: 100)

- [N.B.** 1. Answer all questions under Part-A each question carries 3 marks.
2. Answer all the questions either (A) or (B) in Part-B each question carries 14 marks.]

PART – A

1. State Mohr's Theorem I and II for Slope and Deflection of beam.
2. Derive the expression for maximum deflection of a cantilever beam carrying a point load 'W'kN at its free end.
3. What is fixed beam? Write its degree of indeterminacy.
4. How the degree of indeterminacy of a fixed beam is determined?
5. What is the carry over factor when the far end is (i) hinged (ii) fixed and (iii) over hanging?
6. Define the terms (i) Stiffness factor and (ii) Relative stiffness.
7. Distinguish between short column and long column.
8. What are the different end conditions of column?
9. What are the modes of failure of dams?
10. What is elementary profile of a dam? Draw neat sketch.

[Turn over.....

PART - B

11. (a) (i) Find the maximum slope and deflection of a cantilever beam of length 4m carries a point load of 10 kN at the free end. Take $E=2 \times 10^5 \text{ N/mm}^2$ and $I=4 \times 10^8 \text{ mm}^4$.
- (ii) Find the maximum slope and deflection of a simply supported beam of span 6m carries an UDL of 40kN/m over the entire span. Take $E=2.1 \times 10^5 \text{ N/mm}^2$ and $I=5 \times 10^8 \text{ mm}^4$.

(Or)

- (b) (i) A beam of length 4m is fixed at one end and prop at the other end. The beam carries a central point load of 30 kN. Determine the prop reaction. Draw SFD and BMD.
- (ii) A beam of length 5m is fixed at one end and prop at the other end. The beam carries an UDL of 30 kN/m throughout the length. Determine the prop reaction. Draw SFD and BMD.

12. (a) (i) A fixed beam AB of length 5m is subjected to a point load of 'W' kN at its mid span. The net bending moment at mid span is 30 kN-m. Determine the value of 'W'.
- (ii) A fixed beam AB of length 6m is subjected to an UDL of 'w' kN/m over its entire span. The net bending moment at mid span is 45kN-m. Determine the value of 'w'.

(Or)

- (b) A fixed beam AB of length 5m, 300mm wide and 600mm depth carries an uniformly distributed load of 100 kN/m over its entire span. Determine the fixed end moments. Draw SFD and BMD. Find the maximum central deflection. Take $E=210 \text{ kN/mm}^2$.

13. (a) A continuous beam ABC of 8m length has two equal spans. The supports A and C are fixed. The span AB carries a point load of 40 kN at mid span. The span BC carries a point load 60 kN at mid span. Draw SFD and BMD. Use Moment Distribution method. EI constant.

(Or)

- (b) A two span continuous beam ABC, fixed at A and C. The span AB=8m and BC=6m. The span carries an udl of 20 kN/m and the span BC carries an udl of 40 kN/m. Draw SFD and BMD. Use Moment distribution method. EI constant.

14. (a) (i) A steel bar of rectangular section 60mm x 20mm is 2m long is used as a strut with both ends fixed. Find the Euler's crippling load. Take $E=2 \times 10^5 \text{ N/mm}^2$.
(ii) A solid circular column is 2m long. The diameter is 30mm with one end is fixed and other end is free. Find the Rankine's crippling load. Take Rankine's constant = 1/1600 and Compressive stress = 550 N/mm².

(Or)

- (b) Find the ratio of crippling loads given by Euler's and Rankine's formula for a cast iron tubular column 4.2m long having outer and inner diameters of 160mm and 200mm respectively. The column is hinged at both ends. Take Rankine's constant = 1/1600 and yield point stress = 550 N/mm² and $E = 2.0 \times 10^5 \text{ N/mm}^2$.

15. (a) A rectangular masonry dam 4m wide and 10m high. It retains water on its vertical face to the top. Determine the maximum and minimum intensities of stresses at the base. The unit weight of masonry as 20 kN/m³ and unit weight of water as 9.81 kN/m³. Sketch the stress distribution diagram at the base of the dam.

(Or)

- (b) A masonry trapezoidal dam 12m high, 3m wide at top and 8m wide at bottom retains water on its vertical face to the top. Determine the maximum and minimum intensities of stresses at the base. The unit weight of masonry as 22 kN/m³ and unit weight of water as 9.81 kN/m³. Sketch the stress distribution diagram at the base of the dam.
