539 Register No.: [ ]

April 2024

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.

2. What is meant by Propped cantilever beam? Write its degree of indeterminacy.

3. Write the expression of fixed end moments for a fixed beam carrying an UDL 'w' kN/m over its entire span.

4. What is meant by continuous beam? Sketch any two types.

5. Define Distribution factor.

6. What do you mean by sway frames and non-sway frames?

7. Write any three assumptions made in Euler's theory of long column.

8. What is the effect of eccentric load on short column?

9. What are the conditions to check the stability of a dam?

10. Define Angle of repose.

[Turn over.....

PART – B

11. (a) (i) A simply supported beam 200mm x 400mm size with 5m span carries a point load of 80kN at the mid span. Find the maximum slope and deflection of the beam. Take $E=2\times10^5$ N/mm^2. (7)

(ii) A cantilever beam 100mm x 200mm size with 3m length carries a point load of 10kN at the free end. Find the maximum slope and deflection of the beam. Take $E=2.1\times10^5$ N/mm^2. (7)

(Or)

(b) A cantilever beam of 4m length carries an UDL of 25 kN/m throughout its span and a point load of 15 kN at free end. Find the maximum slope and deflection at the free end. Take E=200kN/mm^2 and I=8×10^8mm^4.

12. (a) A fixed beam of span 6m carries two point loads of 20 kN and 30 kN acts at 2m and 4m from left support. Determine the fixed end moments and draw SFD and BMD.

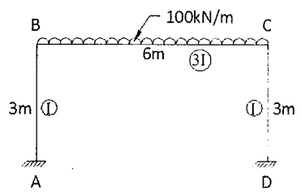
(Or)

(b) A two span continuous beam AB=5m and BC=6m, the support A is fixed and support C is simply supported. The span AB carries an udl of 30kN/m over its entire length. The span BC carries a point load of 60kN at 2m from support B. Draw SFD and BMD. Use theorem of Three moments method.

13. (a) A continuous beam ABC of 10m length has two equal spans. The supports A,B and C are simply supported. The span AB carries a point load of 60 kN at mid span. The span BC carries an udl of 20 kN/m in its length. Draw SFD and BMD. Use Moment distribution method. Take EI as constant.

(Or)

(b) Analyze the Portal frame loaded as shown in figure by Moment distribution method. Draw BMD.



14. (a) A steel bar of 4m long, 35mm internal diameter and 40mm external diameter is used as a column. Calculate the Rankine's crippling load for the following end conditions.

(i) When both ends are hinged.(7)

(ii) When one end is hinged and other end is fixed.
Take Rankine's constant as 1/7500 and yield point stress as 320 N/mm^2. (7)

(Or)

(b) (i) A steel flat 150mm wide and 30mm thick is subjected to a pull of 20kN acting at an eccentricity of 5mm from the centroid in the plane bisecting the thickness. Find the maximum and minimum stresses developed in the section.(7)

(ii) A hollow circular column 250mm diameter and 25mm thick carries a uniaxial compressive vertical load of 150 kN acting at the outer edge of the column. Determine the maximum and minimum stresses developed in the section.(7)

15. (a) A masonry trapezoidal dam 12m high, 3m wide at top and 8m wide at bottom retains water on its vertical face to a height of 10m. Determine the maximum and minimum intensities of stresses at the base. The unit weight of masonry as 22.4kN/m^3 and unit weight of water as 10kN/m^3. Sketch the stress distribution diagram at the base of the dam.

(Or)

(b) A retaining wall 6m high retains soil. Top and bottom width are 1m and 3m respectively. The water level behind the wall rises to 3m below the top surface. The unit weight of the soil and that of submerged soil are 22kN/m^3 and 10kN/m^3 respectively. Angle of repose of earth is 35°. Calculate the resultant thrust per metre run of the wall and its position.
