Register No.: [ ]

355

April 2023

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. What is meant by flexural rigidity and stiffness of a beam?
2. What is meant by Stable and Unstable structures?
3. Write the expression of Fixed end moments for a fixed beam carrying point load 'W' kN at mid span.
4. Write the general methods of analysis of statically indeterminate structures.
5. Define the terms (i) Distribution factor and (ii) Distribution moment.
6. When will a portal frame be subjected to sway?
7. Write the Equivalent length of column in different end conditions.
8. Define limit of eccentricity and middle third rule.
9. What are the conditions to check the stability of a dam?
10. Distinguish between Active and Passive earth pressure.

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PART – B

11. (a) 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=2.1x10^5 N/mm^2 and I=5x10^8 mm^4.

(Or)

(b) A propped cantilever beam AB of length 6m is fixed at one end and rigid prop at the other end. The beam carries an UDL of 10 kN/m over entire length and a point load 30 kN at the mid span. Determine the prop reaction. Draw SFD and BMD.

12. (a) A fixed beam AB of length 6m, 200mm wide and 400mm deep carries a point load of 100 kN at its mid span. Determine the fixed end moments. Draw SFD and BMD. Find the maximum central deflection. Take E=200 kN/mm^2

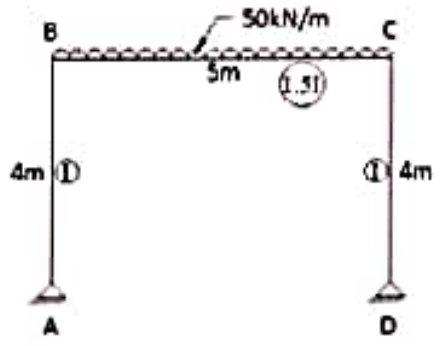
(Or)

(b) A continuous beam ABC of 10m length has two equal spans. The span AB carries an udl of 20 kN/m over its entire length and span BC carries an udl of 40 kN/m over its entire length. The supports A and C are simply supported. Draw SFD and BMD. Use Clapeyron's Theorem of three moments method.

13. (a) A two span continuous beam ABC are fixed at A and simply supported at B and C. The span AB=8m and BC=6m. I_{AB}=2I and I_{BC} = I. The span carries an udl of 30 kN/m and the span BC carries a central point load 100 kN. Draw SFD and BMD. Use Moment distribution method.

(Or)

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



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 $E=2x10^5$ N/mm^2. (7)

(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/mm^2. (7)

(Or)

(b) (i) A hollow rectangular column 1000mm x 600mm overall, the wall thickness being 100mm is carrying a vertical load of 120 kN acting at an eccentricity of 150mm in a plane bisecting the thickness. Calculate the maximum and minimum stresses developed in the section. (7)

(ii) A circular column 450mm diameter is carrying a compressive vertical load of 150 kN acting at an eccentricity of 100mm from its geometrical axis. Determine the maximum and minimum stresses developed in the section. (7)

15. (a) A masonry trapezoidal dam 8m high, 1m wide at top and 3m wide at bottom retains water on its vertical face. Determine the maximum and minimum intensities of stresses at the base, (i) When the reservoir is full and (ii) When the reservoir is empty. The unit weight of masonry as 20kN/m^3 and unit weight of water as 10 kN/m^3. Sketch the stress distribution diagram at the base of the dam.

(Or)

(b) A retaining wall 7m high retains soil on its vertical face. In the top 3m, the weight of retained earth is 16 kN/m^3 and below that the weight of submerged earth is 19 kN/m^3. Angle of repose of earth is 30°. Calculate the magnitude of the resultant thrust per metre run of the wall and locate the line of action.
