Register No.:

2204

October 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. Define deflection of a beam with neat sketch.
2. List out the types of props.
3. Define hogging bending moment.
4. What is meant by Point of Contraflexure?
5. State the formula for stiffness factor of a member with one end fixed and other end hinged.
6. Differentiate between symmetrical and unsymmetrical portal frame.
7. What is long column?
8. State the no tension condition for square section with neat sketch.
9. What are the factors affecting the stability of a dam?
10. What will be the co-efficient of passive earth pressure of soil having angle of repose as 40°?

[Turn over..

PART – B

11. (a) A cantilever beam of 5m length carries two point loads 5 kN and 15 kN at free end and 2m from fixed end respectively. Find the maximum slope and deflection at the free end. Take E=210 kN/mm^2 and I=6x10^8 mm^4.

(Or)

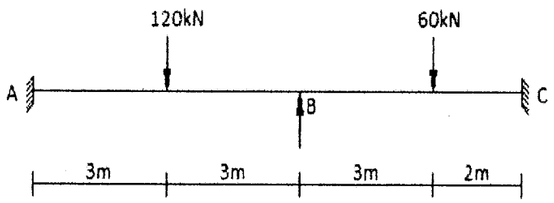
(b) A cantilever beam AB of length 6m is fixed at one end and rigid prop at the other end. The beam carries an UDL of 10 kN/m over entire length and a point load of 30 kN at the mid span. Determine the prop reaction. Draw SFD and BMD.

12. (a) A fixed beam AB of length 9m carries two point loads of 100 kN each at one-third points. Determine the fixed end moments. Draw SFD and BMD. Locate the point of contraflexure.

(Or)

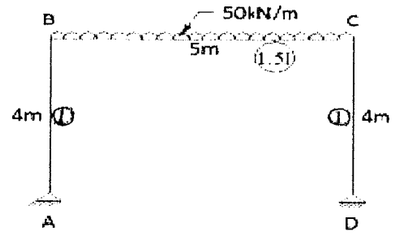
(b) A continuous beam ABC of 10m length has two equal spans. The span AB carries an udl of 20 kN/m over its entire length and span BC carries an udl of 40 kN/m over its entire length. The supports A and C are simply supported. Draw SFD and BMD. Use Clapeyron's Theorem of three moments method.

13. (a) Analyze the continuous beam loaded as shown in figure by Moment distribution method. Draw SFD and BMD. EI is constant.



(Or)

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



14. (a) A steel bar of 3.6m long, 40mm diameter is used as a strut. Calculate the Euler's crippling load for the following end conditions.
(i) When both ends are hinged.
(ii) When one end is hinged and other end is fixed.
(iii) When both ends are fixed.
(iv) When one end is fixed and other end is free.
Take E = 2.10 x 10^5 N/mm^2.

(Or)

(b) (i) A rectangular column 400mm wide and 300mm thick is carrying a vertical load of 100 kN acting at an eccentricity of 50mm in a plane bisecting the width. Determine the maximum and minimum stresses developed.

(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.

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 high, the weight of retained earth is 16 kN/m^3 and below that the submerged earth is 10 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.
