105 Register No.:

April 2019

Time : Three hours *(Maximum Marks: 75)*

(N.B: (1) Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory. Answer any FOUR questions from the remaining in each PART – A and PART – B

(2) Answer division (a) or division (b) of each question in PART – C.

(3) Each question carries 2 marks in PART – A, 3 marks in Part – B and 10 marks in PART – C.)

PART – A

1. Define elastic curve.
2. Define sagging and hogging moments.
3. State the Clapeyron's theorem of three moments.
4. Define carry over factor.
5. Classify the portal frame.
6. Define the term equivalent length of column.
7. Define active earth pressure and passive earth pressure.
8. Mention any four method of analysis of indeterminate beam.

PART – B

9. Derive an expression to find maximum deflection for a cantilever beam with UDL over entire span.
10. State the prop reaction value of a propped cantilever beam subjected to a point load at mid span.
11. Derive the equation for deflection in a fixed beam subjected to a point load 'W' at the centre of the span.
12. Where the hogging moment is maximum in a two span continuous beam having simply supports at the ends?
13. Derive the kern of section for a rectangular section.
14. Distinguish between short column and long column.
15. Show that the C.G of free BMD will lie in the same vertical line.

[Turn over.....

16. A trapezoidal section retaining wall 1m wide at top, 3m wide at base and 6m high retains earth on its face. The angle of repose of soil is 30°. Determine the Rankine's earth pressure per metre run. Take unit weight of earth 18kN/m³.

PART – C

17. (a) A simply supported beam of span 7m carries a central point load 'W'. Calculate the maximum permitted value of 'W'. If (i)The deflection is restricted to 1/350 of span and (ii)The maximum slope is restricted to 1 degree. Take EI=0.8×10⁴ kN.m².

(Or)

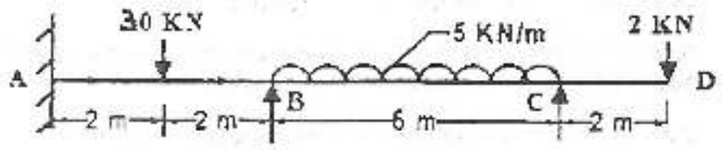
(b) A cantilever beam of span 5m is supported by a rigid prop at the free end. It carries a point load of 30kN at 3m from propped end. Determine the prop reaction and the fixing moment. Draw SFD and BMD.

18. (a) A fixed beam of span 6m is subjected to a point load of 50kN at 2m, from the left support. Determine the fixed end moments and maximum deflection. Take EI=2×10⁴ kN.m². Draw SFD and BMD.

(Or)

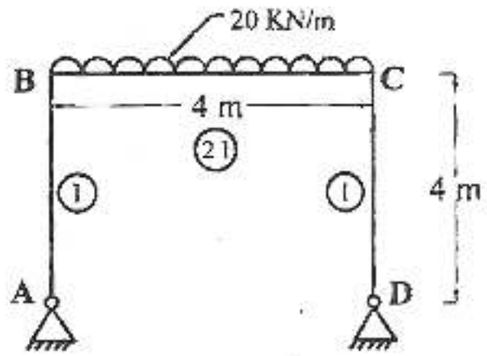
(b) A continuous beam ABCD of 12m long is simply supported at A,B and C. Span AB=6m long and carries a point load of 10kN at its centre. Span BC=3m carries an UDL of 5kN/m to its full length. Span CD carries a point load 5kN at free end D. Draw BMD by using theorem of three moments method.

19. (a) Analyse the continuous beam shown in fig. by moment distribution method. Find the support moments and draw the BMD. Assume EI as constant.



(Or)

(b) Compute the bending moments by moment distribution and draw BMD for the portal frame shown in fig.



20. (a) A steel tube 4.5m long, 30mm external diameter and 3mm thickness 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 the other fixed. Take E=2×10⁵ N/mm².

(Or)

(b) A square chimney has uniform cross section of 20m high. The internal dimensions are 1.2m × 1.2m and the external dimensions are 2.40m × 2.40m, subjected by the horizontal intensity of wind pressure is 1.50kN/m². The specific weight of masonry is 22kN/m³. Calculate the maximum and minimum stress intensities at the base of the chimney.

21. (a) A trapezoidal masonry dam 3m wide at top, 8m wide at the base is 18m high. It retains water upto a depth of 16m on its vertical face. Check the stability of the dam for tension and sliding, if μ=0.6 and FOS=1.5. Take the weight of masonry as 20kN/m³ and that of water as 10kN/m³.

(Or)

(b) A trapezoidal section masonry retaining wall 1m wide at top, 3m wide at its bottom is 8m high. Its retaining earth having level with the top of the wall on its vertical face. The angle of repose of soil is 30°. Find the maximum and minimum stress intensities at base and draw stress distribution diagram, Take unit weight of masonry as 24kN/m³ and that of earth as 18kN/m³.
