Register No.: …… Name: ……

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIFTH SEMESTER B.TECH DEGREE EXAMINATION (R,S), DECEMBER 2023
CIVIL ENGINEERING

(2020 SCHEME)

Course Code : **20CET301**

Course Name: **Structural Analysis – I**

Max. Marks : **100** **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

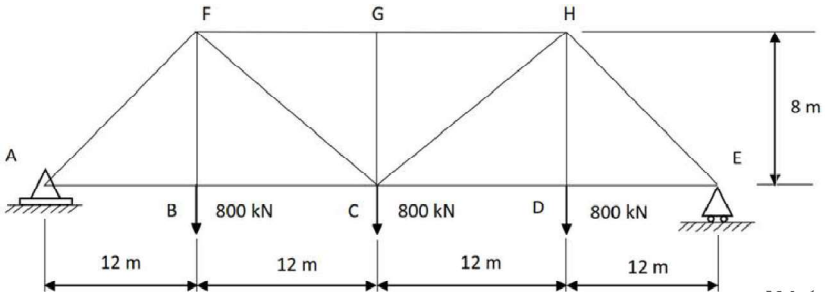
1. Illustrate the Moment-Area theorems.
2. What is the condition for selecting a particular joint for applying method of joints for analysis?
3. Determine the degrees of static indeterminacy and kinematic indeterminacy of a fixed beam with a hinge at mid-span.
4. Differentiate between 'force methods 'and 'displacement methods' of structural analysis.
5. Develop the general Slope-deflection equations for the analysis of an indeterminate structure.
6. What is 'Distribution Factor' at a joint in Structural Analysis?
7. Explain the working of a Suspension Bridge with the help of a schematic diagram.
8. Sketch the forces acting on anchor cables passing over a smooth pulley and a saddle on rollers.
9. State the advantage of an arch over a beam.
10. Classify whether a three-hinged arch is statically determinate or indeterminate. State the equations used for analysis of a three-hinged arch.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. Analyse the truss and list the forces in the members.



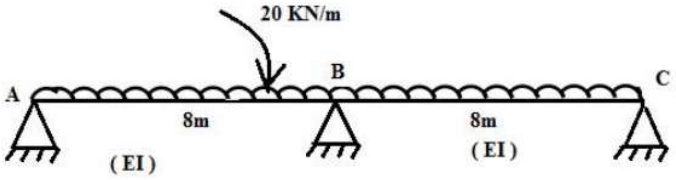
(14)

OR

12. Solve the displacements at the free end of a cantilever loaded with uniformly distributed load throughout the span, applying any method of your choice. (14)

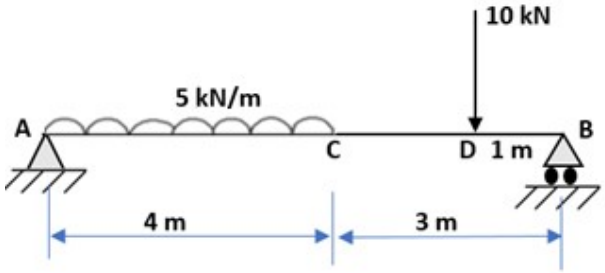
MODULE II

13. Analyse the beam using the principle of least work and plot the BMD. Assume constant flexural rigidity for the members. (14)



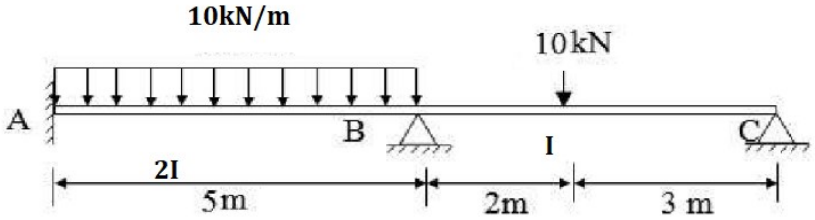
OR

14. Apply the Unit load method to the simply supported beam shown, and evaluate the vertical deflection at C. (14)



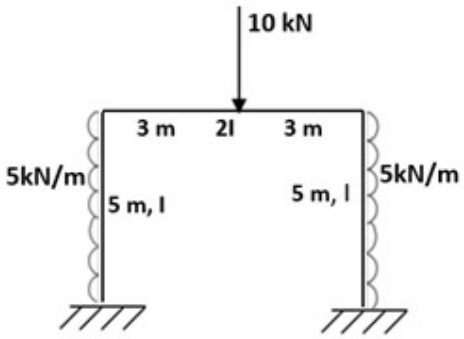
MODULE III

15. Analyse the continuous beam applying the Slope-deflection method and plot the BMD. (14)



OR

16. Analyse the rigid frame using Moment Distribution method and plot the BMD. (14)



MODULE IV

17. A cable of span 6 m is supporting two concentrated loads 8 kN and 15 kN at points which are 2 m and 4 m from left support. The supports are at the same level. Dip of first loaded point is 2.2 m. Calculate the support reactions and dip of second load point. Also calculate the tension in the cable in different segments. (14)

OR

18. A bridge cable is suspended from towers 100m apart and carries a load of 30kN/m on the entire span. If the maximum sag is 8m, calculate the maximum tension in the cable. If the cable is supported by saddles which are stayed by wires inclined at 30^{o} to the horizontal, determine the forces acting on the towers. If the same inclination of back stay passes over pulley, determine the forces on the towers. Height of the tower is 15m. (14)

MODULE V

19. A three- hinged parabolic arch hinged at the springing points A and B and crown point C, has a span of 40m and a central rise of 8m. It carries a uniformly distributed load 40kN/m over the left-half of the span together with a concentrated load of 100kN at the right quarter span point. Find the reactions at the supports, normal thrust, radial shear and bending moment at a section D 10m from the left support. (14)

OR

20. A uniformly distributed load 30kN/m, 6m long crosses a girder of 40m span. Calculate the maximum shear force and bending moment at a section 15m from left support. (14)

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