Register No.: ..... Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIFTH SEMESTER B.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022
CIVIL ENGINEERING

(2020 SCHEME)

Course Code : 20CET301

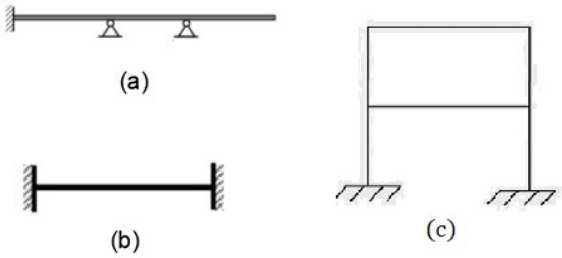
Course Name: Structural Analysis – I

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

PART A

(Answer all questions. Each question carries 3 marks)

1. Illustrate method of section for the analysis of truss.
2. List the steps for applying Moment area theorem in the analysis of structures.
3. State and prove Maxwell's law of reciprocal deflection.
4. Determine the degree of static and kinematic indeterminacy for the following structures:



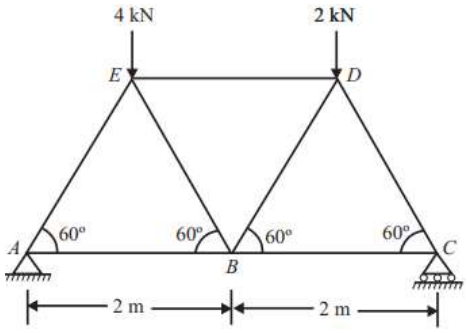
5. Write down the slope deflection equation for a fixed beam loaded with uniformly distributed load of intensity 'w' per metre run and settlement at the right support.
6. Define: a) Carry-over moment b) Carry-over factor c) Distribution factor
7. Give the equation to compute length of the cable if supported at two different levels.
8. Illustrate how the forces acting on the towers of a suspension bridge differ with roller support and saddle support.
9. State the advantage of an arch over a beam.
10. Define influence line diagram and its application in structural analysis.

PART B

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

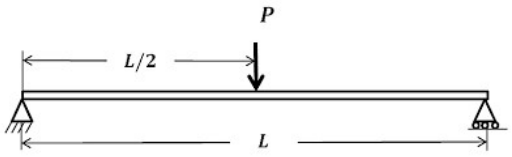
MODULE I

11. Analyse the truss and tabulate the nature and magnitude of member forces. (14)



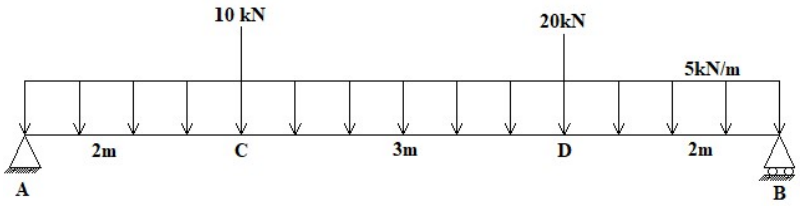
OR

12. Analyse the beam having uniform flexural rigidity using Moment Area method and calculate the deflection at midspan and slope at the supports. (14)



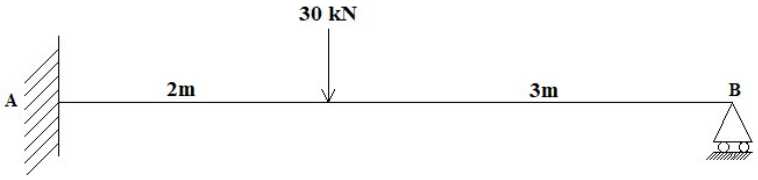
MODULE II

13. Find the vertical deflection at the mid-span of the given beam using unit load method. (14)



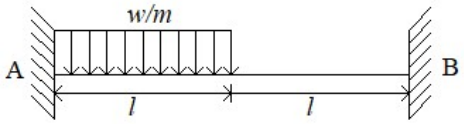
OR

14. Analyse the beam using consistent deformation method. (14)



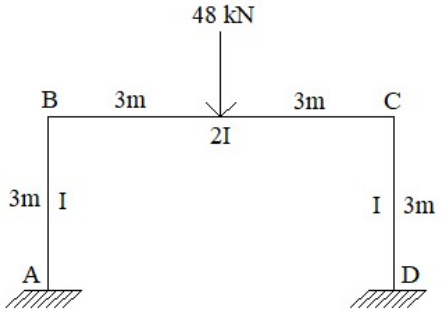
MODULE III

15. Analyse the given beam using Slope-Deflection method and plot the BMD. (14)



OR

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



MODULE IV

17. A cable of span 100m and dip 15m carries a load of 10kN per m run of horizontal span. Find the maximum tension for the cable and the inclination of the cable at the support. The anchor cable is at 30° to the horizontal. Find the forces transmitted to the supporting pier. (14)
    i) If the cable is passed over smooth pulley on the top of the pier and find the maximum bending moment on the pier of height 20m.
    ii) If the cable is clamped to a saddle with smooth rollers resting on the top of the pier.

OR

18. A bridge cable is suspended from towers 70m apart and carries a load of 20kN/m on the entire span. If the maximum sag is 6m, calculate the maximum tension in the cable. If the cable is supported by saddles which are stayed by wires inclined at 30°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 10m. (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 30kN/m over the left-half of the span together with a concentrated load of 150kN 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 60kN/m, 8m long crosses a girder of 30m span. Calculate the maximum shear force and bending moment at a section 12m from left support. Also find the absolute maximum bending moment in the beam. (14)

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