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

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTER B.TECH DEGREE EXAMINATION (S), AUGUST 2023

CIVIL ENGINEERING

(2020 SCHEME)

Course Code : 20CET302

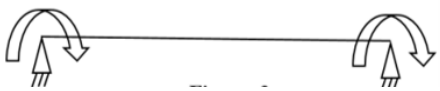
Course Name: Structural Analysis – II

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

PART A

(Answer all questions. Each question carries 3 marks)

1. Derive the shape factor of a rectangular cross section.
2. What are the advantages and disadvantages of approximate methods of structural analysis?
3. What are the assumptions in cantilever method?
4. Derive flexibility matrix for the following beam element.



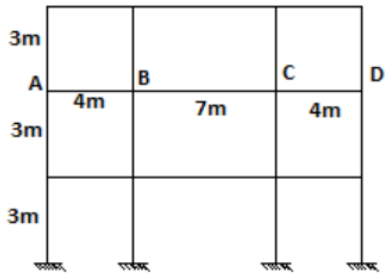
5. Differentiate between force method and displacement method of analysis.
6. Define stiffness influence coefficients. Illustrate with suitable examples.
7. Explain direct stiffness method.
8. Differentiate between local coordinates and global coordinates.
9. Explain D'Alembert's principle.
10. Describe vibration isolation.

PART B

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

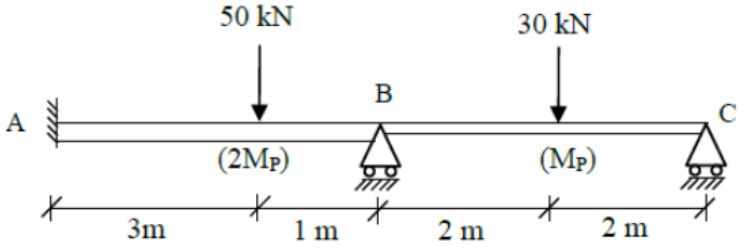
MODULE I

11. In the multi-storeyed building shown in the figure below, frames are spaced at 5.5m interval. The DL on the slab is 3kN/m² and LL is 6kN/m². Analyse the second-floor beam BC for maximum positive bending moment at the mid span. Self-weight of the beam for 4m span is 4 kN/m and that of 7m span is 5kN/m. Use substitute frame method, Assume moment of inertia of all columns = 36 × 10^4 cm^4 and that of all girders = 50 ×10^4 cm^4. (14)



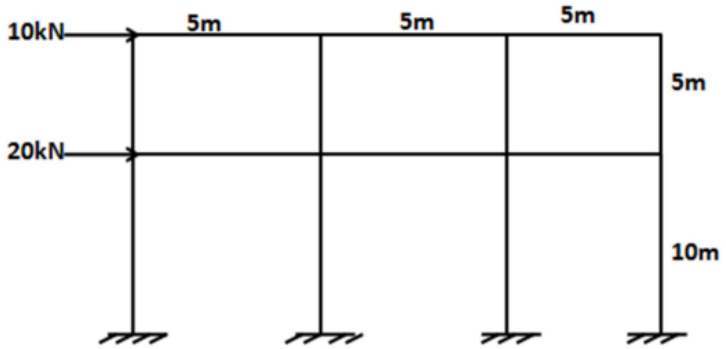
OR

12. Determine the plastic moment carrying capacity M_P for the continuous beam shown in figure below. Take load factor = 1.5. (14)



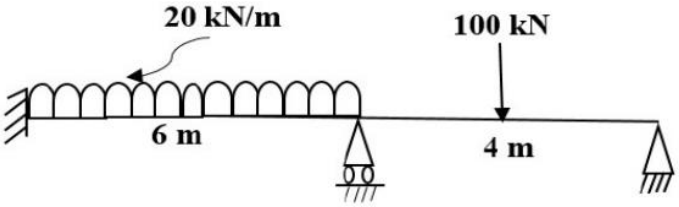
MODULE II

13. Analyse the rigid frame shown in figure using Portal method. Beams and columns are of same size. (14)



OR

14. Analyse the continuous beam shown in figure below using flexibility matrix method and find the bending moments at the supports. (14)



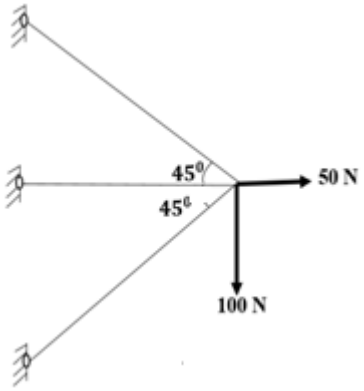
MODULE III

15. a Explain how the effect of lack of fit is considered in stiffness matrix method of analysis. (8)

b Derive the relationship between force transformation matrix and displacement transformation matrix. (6)

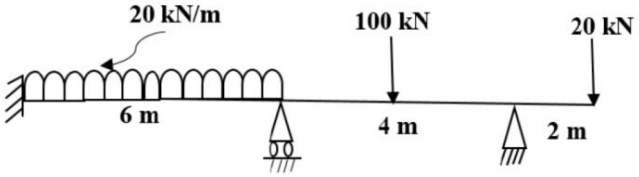
OR

16. Find the member forces in the truss shown in the given figure using stiffness method. (14)



MODULE IV

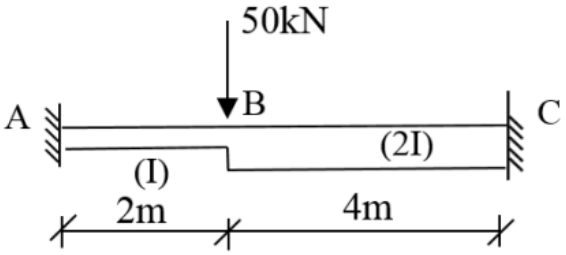
17. Analyse the structure shown by direct stiffness method. Assume constant EI for all the members.



(14)

OR

18. a Determine the slope and deflection at B for the fixed beam shown in figure below by direct stiffness method.



(10)

b Derive the element stiffness matrix for a beam element with two DOF at each node. (4)

MODULE V

19. a Derive the equation of motion of a SDOF system subjected to un-damped free vibration and subsequently the displacement (motion) form. (10)

b Explain transient and steady-state responses. (4)

OR

20. A single storey building idealized as a rigid girder is supported by weightless columns. It was found that a lateral force of 100 kN was required to produce a lateral displacement of 6 mm. The displacement in the return swing was 4mm and the period of displacement cycle was 2s. From the data determine the damped and undamped natural frequencies, effective weight of girder, coefficient of viscous damping and displacement after 6 cycles. (14)

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