Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech Degree Examination (Regular and Supplementary), December 2020

Course Code: CE403

Course Name: STRUCTURL ANALYSIS - III

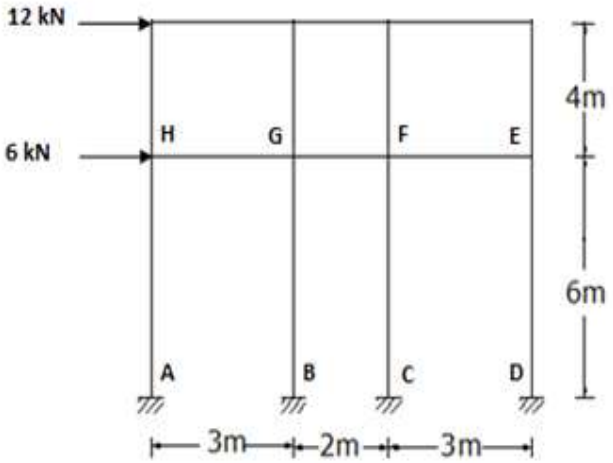
Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks. Marks

1 a) List the assumptions to analyse a frame by cantilever method. (3)

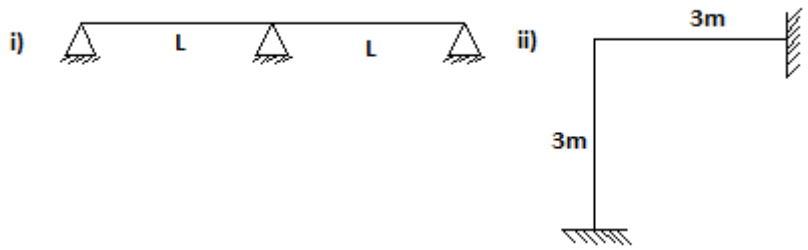
b) Analyse using portal method and find the axial force in columns, shear force in beams and columns, bending moments in beams and columns. Draw the BMD of beams and columns. (12)



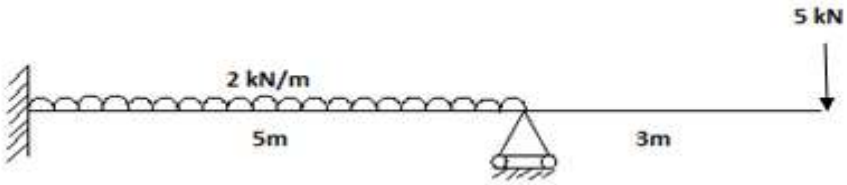
2 a) List the two methods in matrix method of analysis and explain each method. (5)

b) Explain static, external and internal indeterminacy with examples. (5)

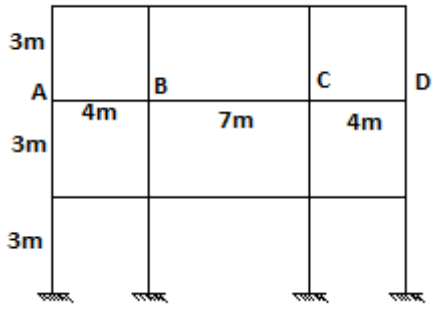
c) Derive the stiffness matrix for the given structures. (5)



3 a) Find the equivalent joint load matrix for the beam given below. (5)



b) In a multi-storey building frame spaced at 5.5m interval. The DL on the slab is 3kN/m^2 and LL is 6kN/m^2. 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 that I of the columns = $36 \times 10^4 cm^4$ and I of all girder = $50 \times 10^4 cm^4$ (10)

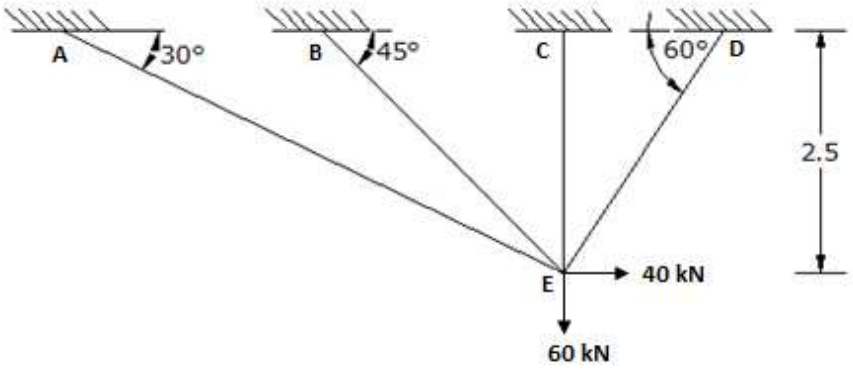


PART B

Answer any two full questions, each carries 15 marks.

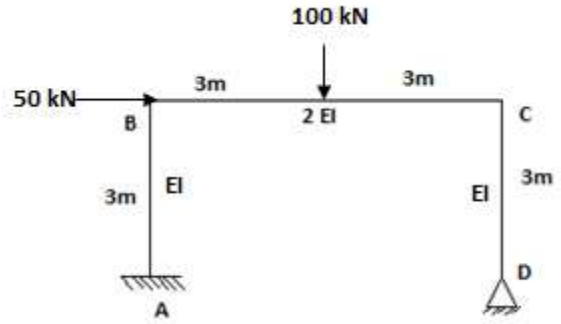
4 a) Develop flexibility influence coefficients of a simply supported beam. (5)

b) Find the forces in the members of the truss loaded as shown in figure using stiffness method. (10)



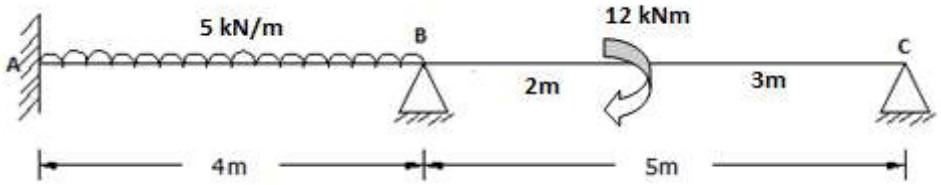
5 a) Explain how the effect of lack of fit is considered in flexibility matrix method of Analysis. (3)

b) Analyse the frame shown in figure by flexibility method. (12)



6 a) Derive the relationship between force transformation matrix and displacement transformation matrix. (5)

b) Analyse the continuous beam shown in Figure, using flexibility matrix method and find the bending moments. (10)

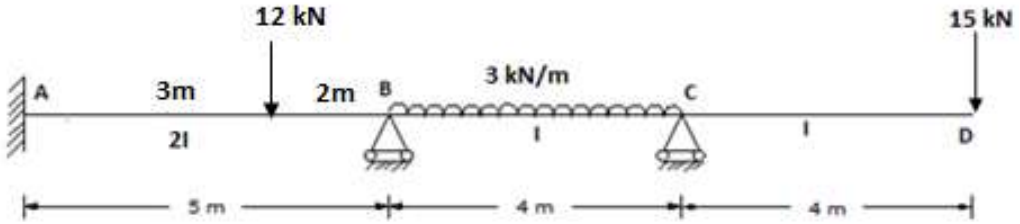


PART C

Answer any two full questions, each carries 20 marks.

7 a) How global stiffness matrix can be derived from the element stiffness matrix? (5)

b) Analyse the continuous beam shown in Figure, using direct stiffness method and find the bending moments. (15)



8 a) Discuss the concept of vibration isolation and its applications. (5)

b) Analyse a continuous beam ABCD by direct stiffness method. Assume EI is constant for all the members. The three spans AB, BC and CD are 4 m long. The extreme ends A and D are fixed. At the continuous joints B and C, roller supports are provided. BC span carries a central concentrated load of 10kN and CD span carries a udl of 2kN/m. Draw the BMD. (15)

9 a) State and explain D'Alembert's principle. (4)

b) Derive the equations for response of SDOF system subjected to damped free vibration in 'x' direction with inertia constant m, spring constant k and damping constant c. Draw the response diagram also. (8)

c) A system vibrating with a natural frequency of 6Hz starts with an initial amplitude of 2cm and an initial velocity of 25 cm/s. Determine the natural period, amplitude, maximum velocity, maximum acceleration and phase angle. Also write the equation of motion of a vibrating system. (8)

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