Reg No.:_____ **00000CE403121902** Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh semester B.Tech degree examinations (S), September 2020

Course Code: CE403
Course Name: STRUCTURL ANALYSIS - III

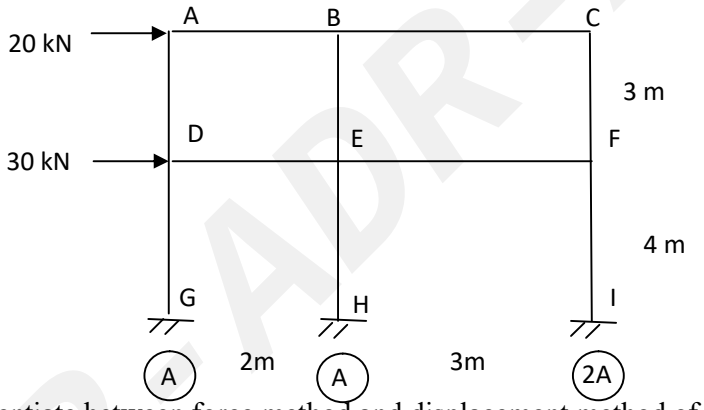
Max. Marks: 100 Duration: 3 Hours

PART A

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

1 a) What is a substitute frame? (2)

b) Analyse the rigid frame loaded as shown in figure using cantilever method. Cross section areas of columns are given as A, A and 2A. (13)

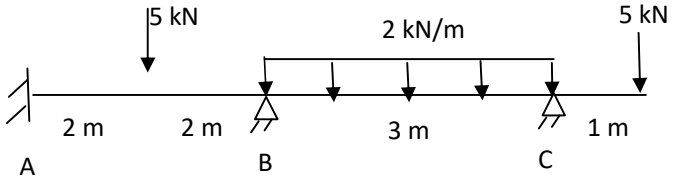


2 a) Differentiate between force method and displacement method of analysis. (5)

b) Define static indeterminacy and kinematic indeterminacy. Also determine the static and kinematic indeterminacy of a propped cantilever beam subjected to transverse loads. (5)

c) Explain how the distributed loads are accounted for in matrix method of analysis (5)

3 a) Determine the equivalent joint load for the continuous beam loaded as shown in figure. (7)



b) Define flexibility influence coefficient. (3)

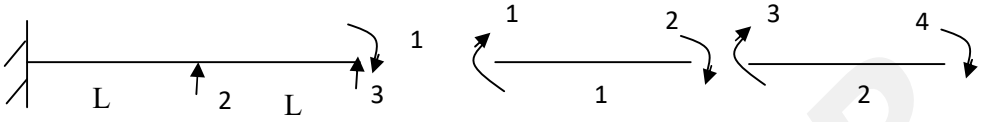
c) Derive the relationship between flexibility influence coefficient and stiffness influence coefficient. (5)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Write down the properties of flexibility matrix. (3)

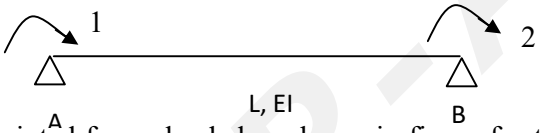
b) Generate the load transformation matrix and element flexibility matrix for the system coordinates and element coordinates given below. (6)



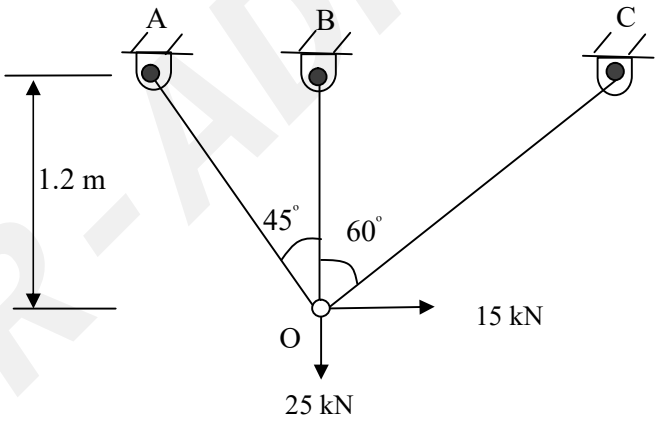
System and system coordinates Elements and element coordinates

c) Explain how the effect of lack of fit is considered in flexibility matrix method of analysis. (6)

5 a) Derive the flexibility matrix for the beam element with coordinates as shown in figure. (5)

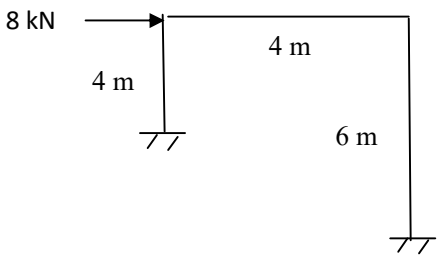


b) Analyse the pin jointed frame loaded as shown in figure for the member forces, using flexibility method. Take constant AE for all members. (10)



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

b) Analyse the given portal frame using stiffness matrix method. Take EI constant. (10)

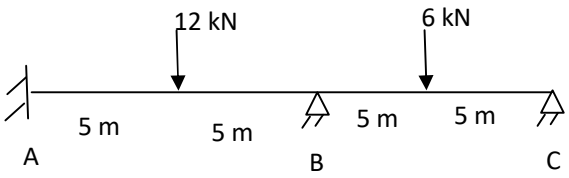


PART C

Answer any two full questions, each carries 20 marks.

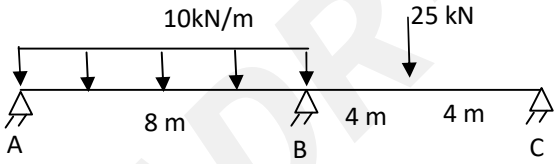
7 a) Discuss on the rotation of axis in two dimension. (5)

b) Analyse the given continuous beam using direct stiffness method. EI constant. (15)



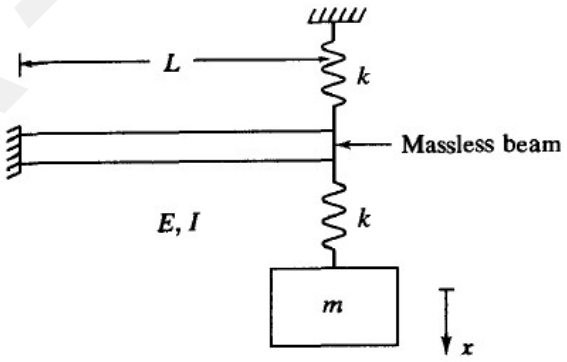
8 a) Discuss the global assembly procedure of element stiffness matrices in direct stiffness method. (5)

b) Analyse the given continuous beam using direct stiffness method. Take EI constant for all members. (15)



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

b) Set up the equation of motion and hence determine the natural frequency for small vertical vibrations of the idealization shown in figure. (8)



Take L = 3m. EI for beam = 27 Nm^2, stiffness for each spring, k = 3 N/m and mass m= 3 kg

c) A 50 kg turbine is mounted on four parallel springs, each of stiffness 3 x 10^5 N/m. When the machine operates at 20 Hz, its steady-state amplitude is observed as 1.8 mm. Compute the magnitude of the excitation? (8)

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