

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: CE403
Course Name: STRUCTURAL ANALYSIS - III

Max. Marks: 100

Duration: 3 Hours

Assume missing data if any and state it

PART A

Answer any two full questions, each carries 15 marks.

Marks

- 1 a) What are the assumptions involved in cantilever method? 3
- b) Analyse the frame in Figure.1 using portal method. Beams and columns have same size. 12

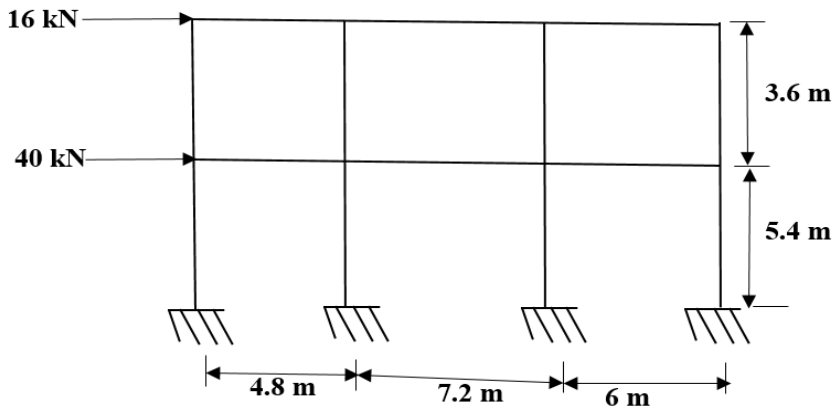


Figure. 1

- 2 a) Find the maximum hogging moment and shear force at the support due to gravity loading in the frame shown in Figure.2. Frames are spaced at 3.0 m c/c. Dead load = 3 kN/m², Live load = 2 kN/m², Weight of beam = 2 kN/m and storey height = 3 m. 10

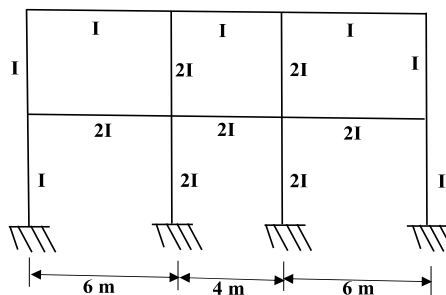


Figure. 2

- b) Derive Flexibility matrix for the following beam element in Figure.3.

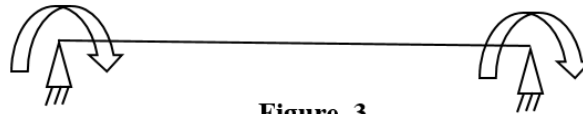


Figure. 3

5

- 3 a) Find the Kinematic indeterminacy and Static indeterminacy of the continuous beam (Figure.4) , pin jointed frame (Figure.5) and rigid frame (Figure.6)

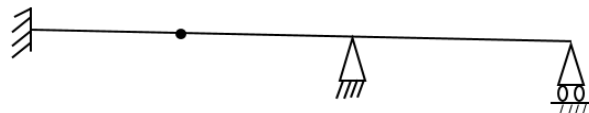


Figure. 4- Discard axial forces

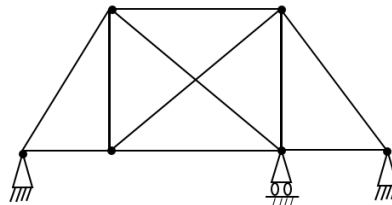


Figure. 5

9

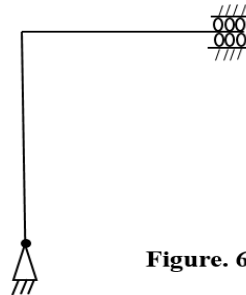


Figure. 6

- b) Derive Flexibility matrix for the truss element. 3
 c) Define flexibility coefficient and stiffness coefficient. 3

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) Analyse the continuous beam shown in Figure.7, using flexibility matrix method and find the bending moments.

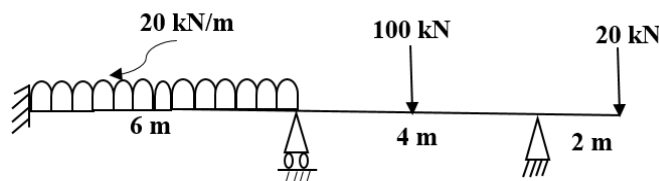
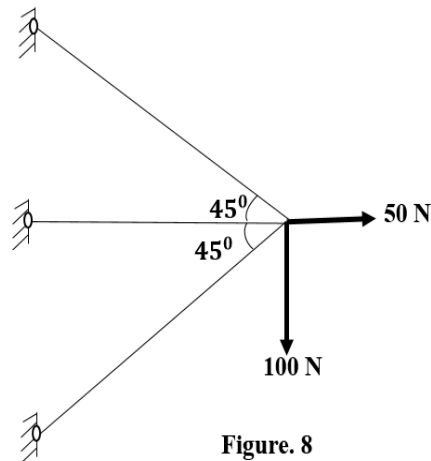


Figure. 7

15

- 5 a) Establish the relationship between flexibility matrix and stiffness matrix. 4
 b) What is displacement transformation matrix? 5
 c) What is lack of fit? Explain one method to estimate the member forces due to lack of fit using either flexibility or stiffness methods. 6
- 6 a) Find the member forces in the truss shown in Figure.8 using stiffness method. 15



PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Analyse and draw bending moment diagram for the frame shown in Figure.9 using direct stiffness method.

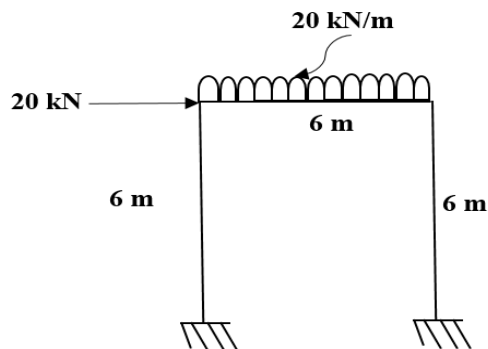


Figure. 9

- b) What is direct stiffness method? 3
- 8 a) Differentiate between local coordinates and global coordinates. 4
 b) How global stiffness matrix can be derived from the element stiffness matrix? 6
 c) Describe Vibration Isolation? What are the different types of vibration isolation? 10
- 9 a) What is critical damping? 3
 b) What is magnification factor? 3

- c) A person standing on a spring produces a deflection of 1.0 mm to the spring. Find the natural frequency and Time period. 4
- d) A vibrating system consists of mass of 10 kg, spring of stiffness 240 N/m and a damper with a damper coefficient of 10 N-s/m. Determine 10
- i) Damping factor
 - ii) Natural frequency of damped vibration
 - iii) Logarithmic decrement
 - iv) Ratio of successive amplitudes
 - v) Number of cycles after which initial amplitude reduced to 25%
