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# PRESIDENCY UNIVERSITY
# BENGALURU

## SCHOOL OF ENGINEERING
## END TERM EXAMINATION - JAN 2023

**Semester :** Semester V - 2020
**Course Code :** MEC3005
**Course Name :** Sem V - MEC3005 - Finite Element Analysis
**Program :** B.Tech. Mechanical Engineering

**Date :** 6-JAN-2023
**Time :** 9.30AM - 12.30PM
**Max Marks :** 100
**Weightage :** 50%

**Instructions:**
*(i) Read all questions carefully and answer accordingly.*
*(ii) Question paper consists of 3 parts.*
*(iii) Scientific and non-programmable calculator are permitted.*

### PART A

**ANSWER ALL THE FIVE QUESTIONS** **5 X 2 = 10M**

**1.** What do you mean by Young's modulus?

(CO1) [Knowledge]

**2.** What is the diffrence between Bars and Beams element ?

(CO2) [Knowledge]

**3.** Write down the Global stiffness matrix equation of Bar Element

(CO3) [Knowledge]

**4.** What is 2D Element ?

(CO4) [Knowledge]

**5.** What are the process of FEM ?

(CO5) [Knowledge]

### PART B

**ANSWER ALL THE SIX QUESTIONS** **6 X 10 = 60M**

**6.** What is finite element method ? list the advantages and disadvantages of FEM over other numerical method FDM, BEM.

(CO1) [Comprehension]

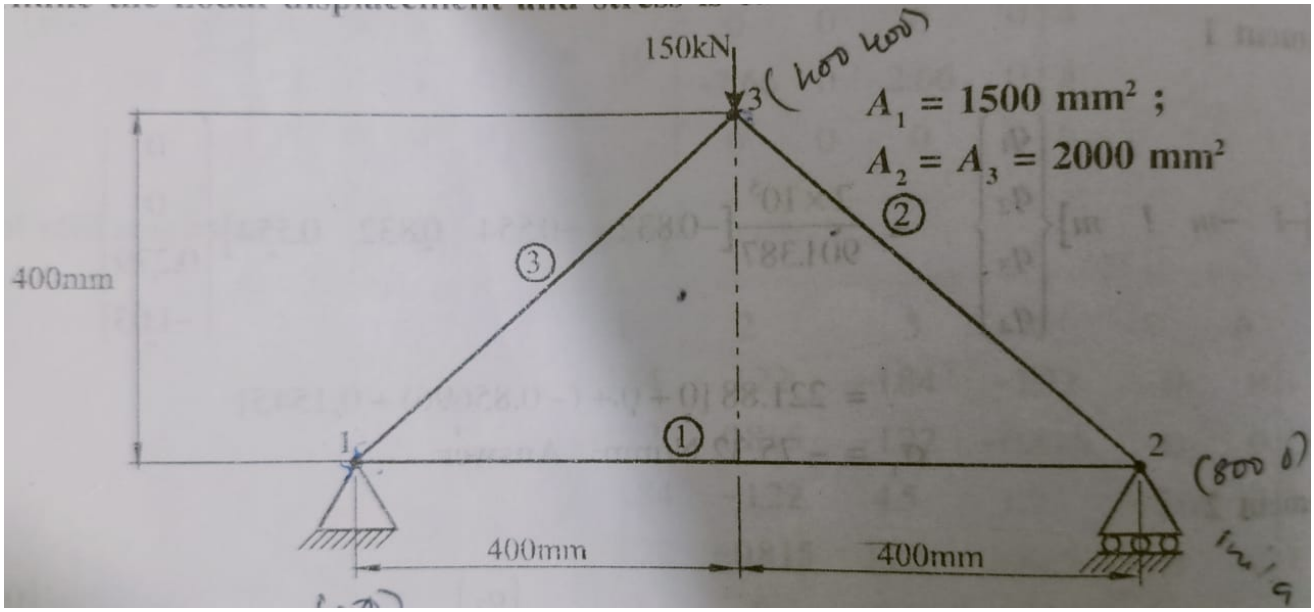
**7.** Derive the stiffness matrix stress at each node and reaction support for the beam element.

(CO2) [Comprehension]

**8.** Diffrentiate between the Elimination method and Penalty method.

(CO3) [Comprehension]

**9.** Consider the three bar truss element shown in figure It is given that E=200GPA Determine the nodal displacement and stress is each member,




(CO4) [Comprehension]

**10.** What do you understand FEM? Briefly explain the steps involed in FEM, with example.

(CO5) [Comprehension]

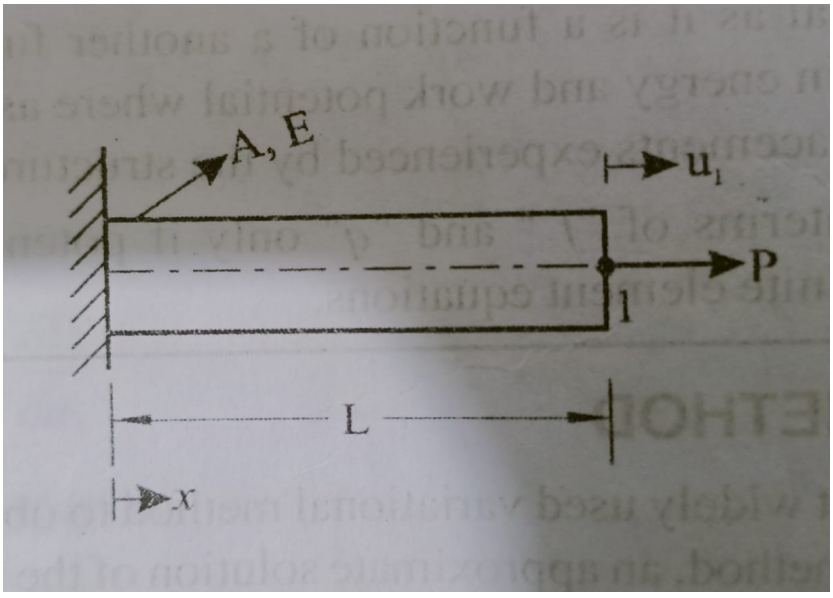
**11.** Derive and expression for element stiffness matrix for a 2D Trusess element.

(CO2) [Comprehension]

## PART C

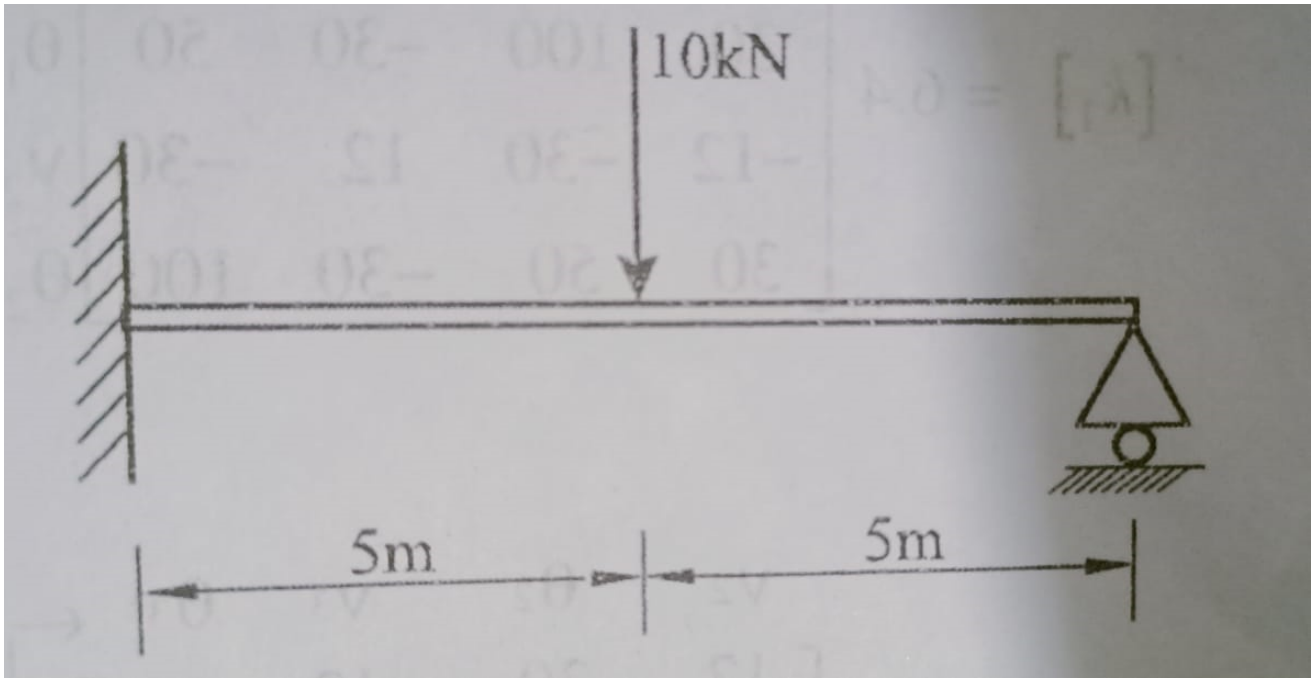
**ANSWER ALL THE TWO QUESTIONS** **2 X 15 = 30M**

**12.** By Rayleigh-Ritz Method for a bar cross sectional area A Elastic modulus E, subjected to uniaxial loading P, show that a distance x from fixed end is u=(P/AE) x and hence determine the end deflection and the stress of the bar.




(CO1) [Application]

**13.** For a Beam Element Shown in Figure Below Determine the deflection under th given load. Take E= 2x10^11 N/m² and I= 4x10^-6 m^4




(CO2) [Application]

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