

# UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

**End Semester Examination, May 2021**

**Programme Name: M.Tech. Structural Engineering**

**Semester : II**

**Course Name : Finite Element Method**

**Time : 03 hrs**

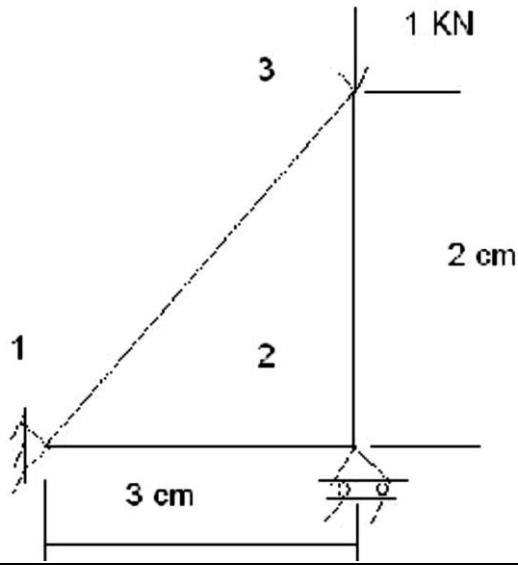
**Course Code : CIVL 7014**

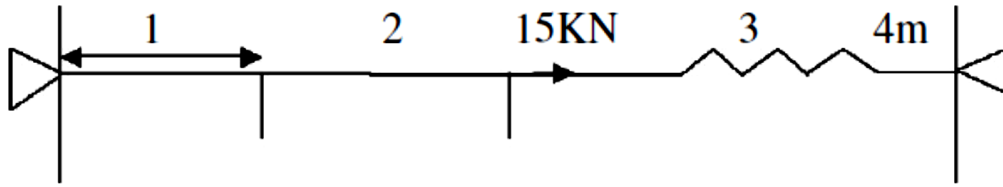
**Max. Marks : 100**

**Nos. of page(s) : 2**

**Instructions:**

**Answer all questions of Section A, B & C**

S. No.	SECTION A	Marks	CO
Q 1	Name the weighted residual methods.	5	CO1
Q 2	What are the classifications of coordinates?	5	CO1
Q 3	Define shape function	5	CO1
Q 4	Write down the stress strain relationship matrix for plane stress conditions.	5	CO1
Q 5	Distinguish between potential energy function and potential energy functional	5	CO1
Q 6	Explain Rayleigh-Ritz method.	5	CO1
<b>SECTION B</b>			
Q 7	<p>Evaluate the displacement at node 1, 2. Take <math>t=0.5</math> cm, <math>E=2 \times 10^7</math> N/cm<sup>2</sup>, <math>\mu = 0.27</math> using plane stress condition.</p> 	10	CO3
Q 8	Explain Gauss Integration method with Suitable examples.	10	CO3
Q 9	Determine equations for Moment, shear and deflection for Fixed beam with UDL and span length L. EI constant	10	CO2
Q 10	For the bar assemblage as shown in fig. Determine (i)Global stiffness matrix (ii)Nodal displacement	10	CO2



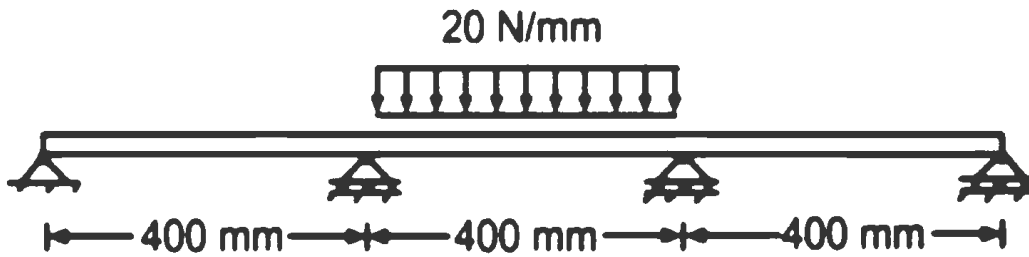
Q 11 Using a suitable example define Finite Element Analysis of Skew Plate.  
OR  
 Using a suitable example define Finite Element Analysis of Shell

10

CO4

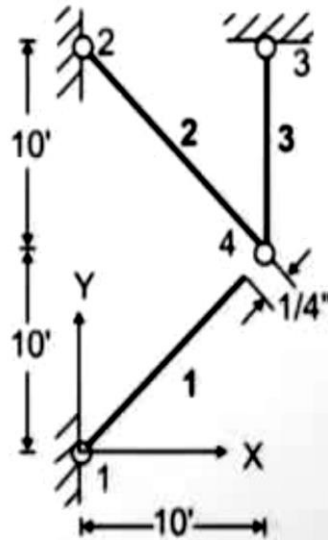
**SECTION-C**

Q 12 Find deflections, moments and shears for a continuous beam shown in figure.  
 Assume  $E = 200 \text{ GPa}$  and  $I = 10^5 \text{ mm}^4$



OR

Find the displacements and axial forces in the truss shown in figure below if the element 1 is fabricated  $\frac{1}{4}$  inches (6.35 mm) too short and is forced to fit during assembly. Assume  $E = 30000 \text{ ksi}$  (206842.8 MPa) and  $A = 10 \text{ in}^2$  (6451.6  $\text{mm}^2$ )



20

CO2