Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

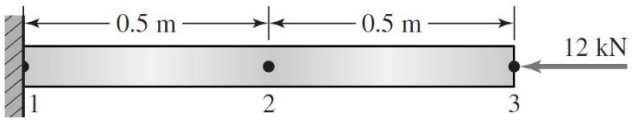
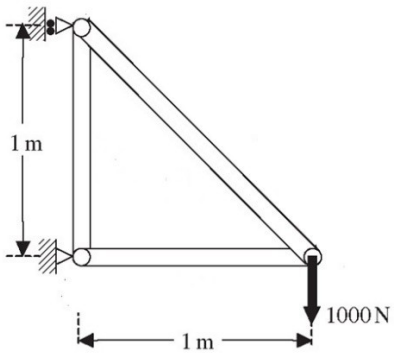
End Semester Examination, March 2019

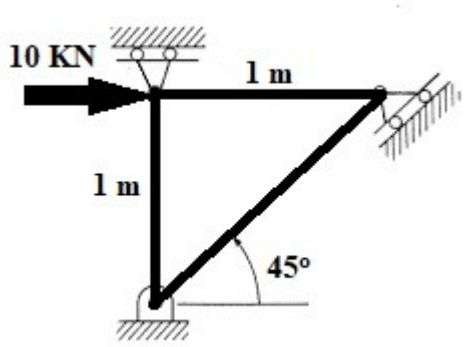
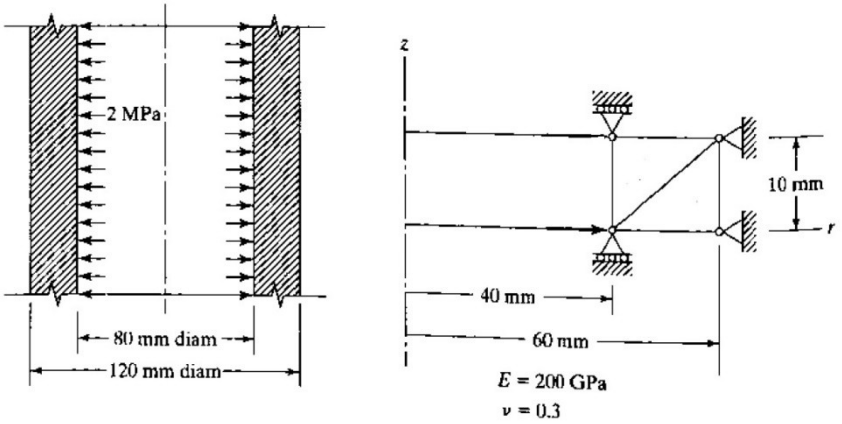
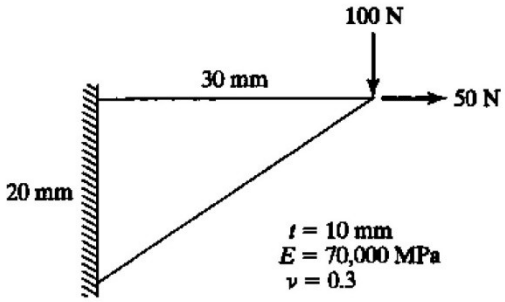
Programme Name: B.Tech ADE **Semester : 8th**
Course Name : Finite element method **Time : 03 hrs**
Course Code : ADEG 471 **Max. Marks : 100**
Nos. of page(s) : 03

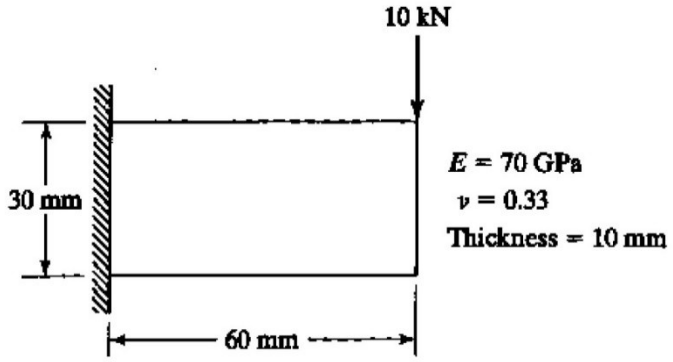
SECTION A

S. No.		Marks	CO
Q 1	Explain the principle of minimum total potential energy.	**5**	**CO1**
Q 2	Describe Rayleigh Ritz method.	**5**	**CO1**
Q 3	Explain C^o and C^1 continuity.	**5**	**CO1**
Q 4	Describe constant strain, linear strain and cubic strain triangles.	**5**	**CO1**

SECTION B

Q 5	Derive the expressions of shape function for a Four-Noded Quadrilateral.	**10**	**CO2**
Q 6	Describe the two point formula of numerical integration.	**10**	**CO1**
Q 7	A steel rod subjected to compression is modeled by two bar elements, as shown in Figure. Determine the nodal displacements and the axial stress in each element.  $E = 207$ GPa $A = 500$ mm^2	**10**	**CO3**
Q 8	A plane truss is loaded and supported as shown in Figure. Determine the displacements at the ends using finite element method. Take, E = 200 GPa and A = 200 mm^2 	**10**	**CO3**

	OR		
	Determine the nodal displacements of the truss structure shown in Figure using finite element method. Take, E = 200 GPa and A = 200 mm^2  	**10**	**CO3**
	SECTION-C		
Q 9	A long cylinder of inside diameter 80 mm and outside diameter 120 mm snugly fits in a hole over its full length. The cylinder is then subjected to an internal pressure of 2 MPa. Using two elements on the 10 mm length shown, find the displacements at the inner radius. Also, validate your findings analytically.  	**20**	**CO4**
Q 10	Determine the deflection at the point of load application in the triangular plate shown in Figure.  	**20**	**CO3**
	OR		

	A rectangular plate is loaded and supported as shown in Figure. Find the stiffness matrix and apply the boundary conditions using Penalty approach. Use a four noded quadrilateral element.  	**20**	**CO3**