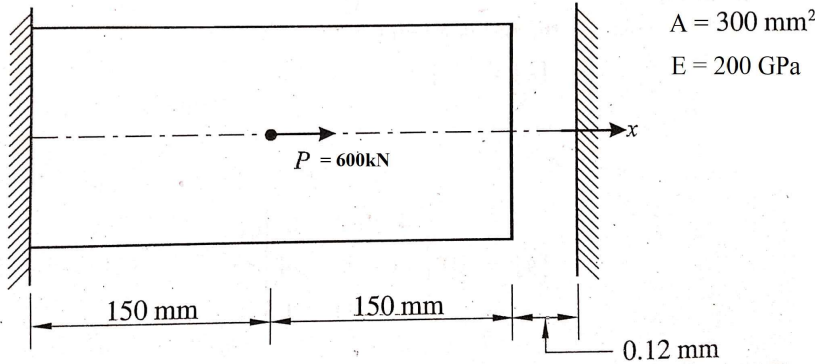
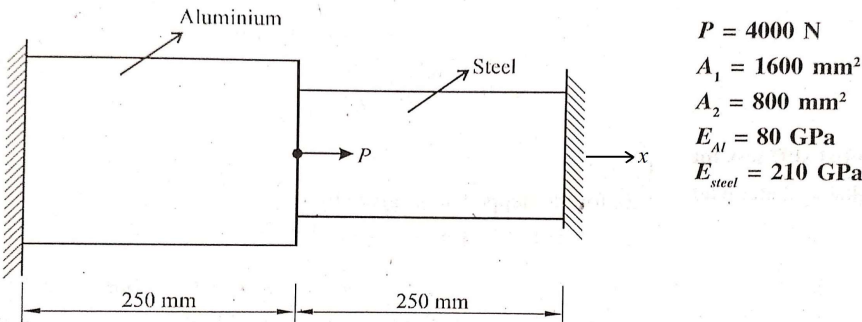


CONTINUOUS INTERNAL EVALUATION- 1

Dept: ME	Sem / Div: 6 A	Sub: Finite Element Methods	S Code: 18ME61
Date: 24/05/2021	Time: 9:30 am -11:00 am	Max Marks: 50	Elective: N
Note: Answer any 2 full questions, choosing one full question from each part.			

Q N	Questions	Marks	RBT	COs
PART A				
1 a	<p>A bar is axially loaded with a force P at its mid point as shown below. Using elimination approach of handling boundary condition, determine the displacement, stress and support reaction in the bar.</p>  <p style="text-align: right;"> $A = 300 \text{ mm}^2$ $E = 200 \text{ GPa}$ </p>	13	L3	CO3
b	Differentiate between plane stress and plane strain problems. Write the stress strain relations for both.	6	L2	CO1
c	Explain different types of coordinate system used in FEM.	6	L2	CO1
OR				
2 a	<p>A stepped bar is subjected to axial force as shown below. Using penalty approach of handling boundary condition, solve for displacement, stresses in each member and reaction force at the support.</p>  <p style="text-align: right;"> $P = 4000 \text{ N}$ $A_1 = 1600 \text{ mm}^2$ $A_2 = 800 \text{ mm}^2$ $E_{Al} = 80 \text{ GPa}$ $E_{steel} = 210 \text{ GPa}$ </p>	13	L3	CO3
b	Explain simplex, complex and multiplex elements.	6	L2	CO1
c	Discuss the convergence and compatibility requirements of elements.	6	L2	CO1

CONTINUOUS INTERNAL EVALUATION- 1

PART B

3	a	Derive the stiffness matrix for 1D bar element using minimum potential energy approach.	10	L3	CO2
	b	Explain the steps involved in FEM.	8	L2	CO1
	c	Explain briefly about node location system and numbering scheme.	7	L2	CO1
OR					
4	a	Derive the shape function for 1D bar element in natural coordinate system.	10	L3	CO2
	b	List the different types of elements with neat sketch.	8	L2	CO1
	c	Write a short note on geometrical isotropy for 2D Pascal triangle.	7	L2	CO1