PVP 22

Code: 22MEMD2T3

I M.Tech - II Semester – Regular Examinations - JULY - 2023

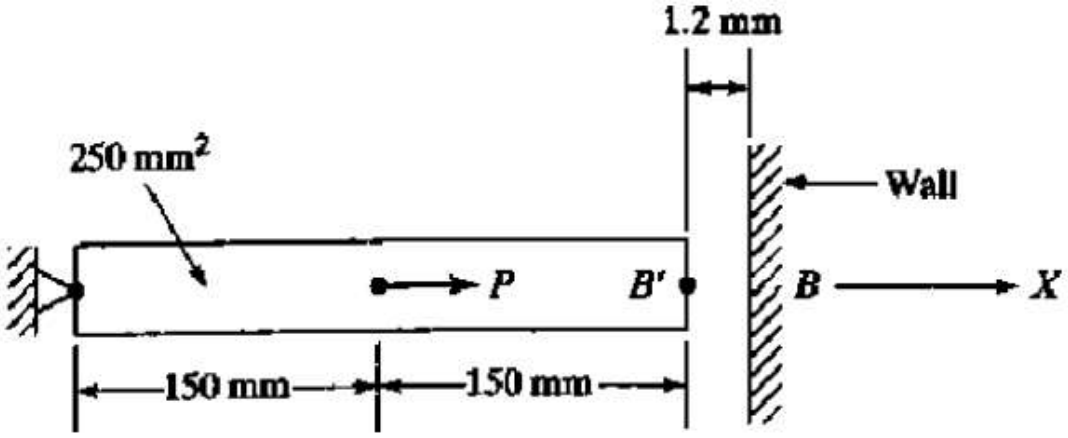
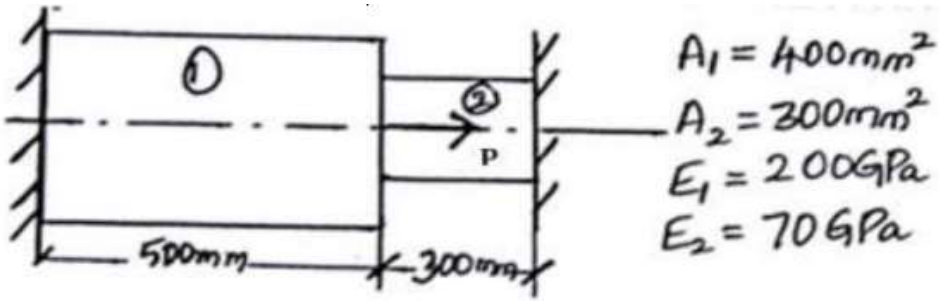
FINITE ELEMENT METHODS IN ENGINEERING
(MACHINE DESIGN)

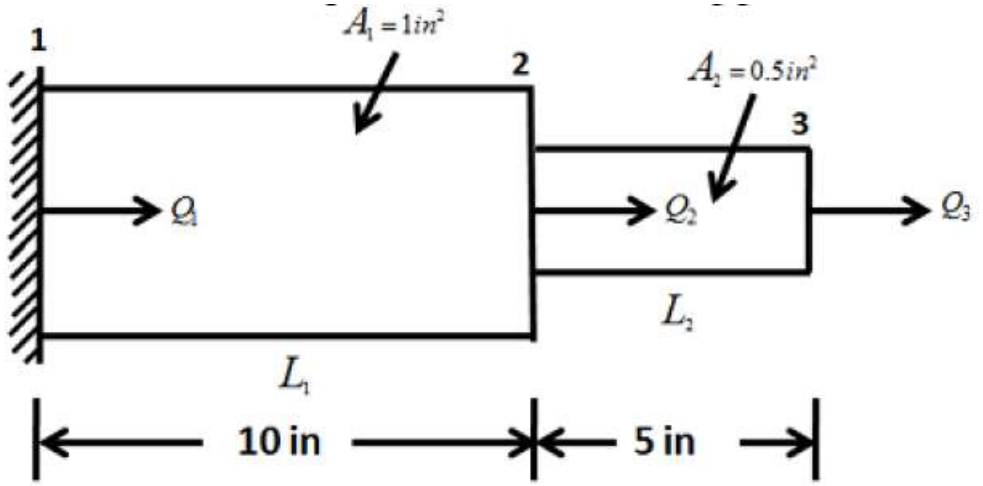
Duration: 3 hours Max. Marks: 60

Note: 1. This paper contains 4 questions from 4 units of Syllabus. Each unit carries 15 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
		UNIT-I			
1	a)	Using the stress-equilibrium equations, determine the governing differential equation for a prismatic bar subjected to body load only.	L3	CO1	10 M
	b)	Explain Raleigh Ritz method by taking a suitable example.	L2	CO1	5 M
		OR			
2	a)	Explain the requirements for the selection of interpolation function.	L2	CO1	7 M
	b)	Explain assembly of stiffness matrix by making use of an example.	L3	CO1	8 M
		UNIT-II			
3		Determine the displacements stress and support reactions in the structure shown in the figure. Take $P = 62 \times 10^3$ N, $E=20 \times 10^3$ N/mm^2	L4	CO2	15 M

					
	OR				
4	A Stepped composite bar is loaded as shown in the Figure. Determine the nodal displacements in the bar. P=200kN. 		L4	CO2	15 M
	UNIT-III				
5	a)	Present the strain displacement relation of an axisymmetric solid and explain the terms involved in it.	L3	CO3	10 M
	b)	Derive and plot the shape functions of CST element.	L3	CO3	5 M
	OR				
6	Use two point Gaussian quadrature to obtain an exact value for the integral $$I = \int_{-1}^{1}\int_{-1}^{1}(r^3-1)(s-1)^2\,drds$$		L4	CO3	15 M

	UNIT-IV			
7	Determine the Eigen values and Frequencies for the stepped bar shown in Figure.  $E = 30 \times 10^6\ psi$ $Specific\ weight\ f = \frac{0.283lb}{in^2}$	L4	CO4	15 M
	OR			
8	A furnace wall is made up of three layers, inside layer with thermal conductivity 8.5 W/mK, the middle layer with conductivity 0.25 W/mK, the outer layer with conductivity 0.08 W/mK. The respective thicknesses of the inner, middle and outer layer are 25cm, 5cm and 3cm respectively. The inside temperature of the wall is 600°C and outside of the wall is exposed to atmospheric air at 30°C with heat transfer coefficient of 45 W/m^2K. Determine the nodal temperatures.	L4	CO4	15 M