Internal Assessment Test III – May 2019

Sub:	Finite Element Methods			**Code:**	15ME61
Date: 15/ 05 / 2019	Duration: 90 mins	Max Marks: 50	**Sem:** VI	**Branch:**	MECH

Note: Answer any **five** questions.

		Marks	OBE CO	OBE RBT
1	Derive the Hermite shape functions for a beam element.	**10**	CO3	L2
2	For the beam and loading shown in Figure 1, determine i. Slopes at 2 and 3 ii. The vertical deflection at the midpoint of the distributed load. Take E = 200 GPa, I = 4×10^6 mm^4.	**10**	CO4	L3
3	Derive torsional stiffness matrix for a circular shaft subjected to pure torsion	**10**	CO4	L3
4	For a stepped bar shown in figure 2. Determine the eigen values and eigen vector. Take A_1 = 400 mm^2 A_2 = 200 mm^2, ρ=7850 kg/m^3, E = 200 GPa	**10**	CO4	L3
5	Deduce the governing differential equation for a one dimensional fluid flow through a porous medium	**10**	CO 5	L2
6	For the smooth pipe of variable c/s shown in figure 3. Determine the potential at the junction the velocities in each section of pipe and the volumetric flow rate. The potential at the left end is P_1 = 12 m^2/s and that at right end is P_4 = 3 m^2/s. Take K_x = 1	**10**	CO5	L3

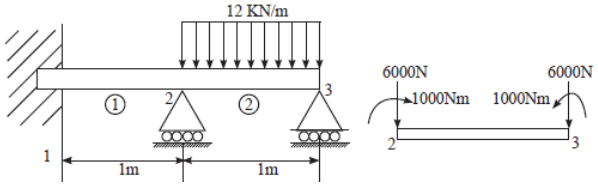

Figure 1

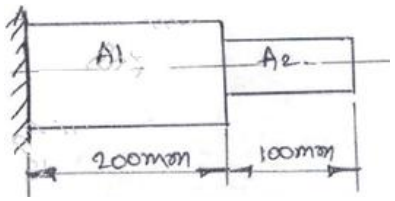

Figure 2

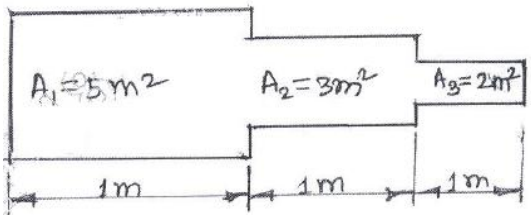

Figure 3