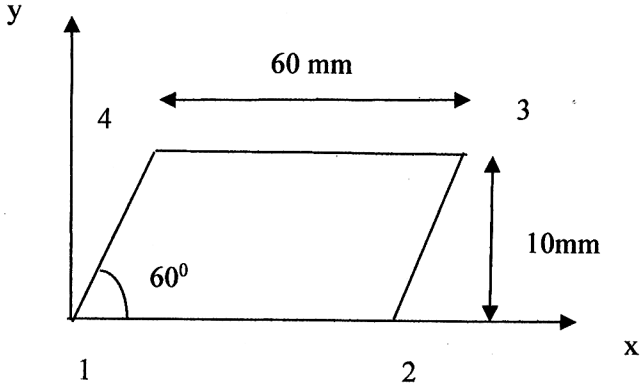


B.E. CIVIL ENGINEERING FOURTH YEAR SECOND SEM. EXAM. -2025**Subject: THEORY OF STRUCTURES IV (HONS.) Time: 3 hours****Full Marks 100**

No. of questions	<u>Answer all questions</u>	Marks 15+16+14+25+ 10+15+5=100
1.	Deduce the differential equations of plate bending with neat sketch.	CO1 15
2.	A simply supported rectangular plate subjected to sinusoidal loading distributed over the plate surface is given by the expression. $q = q_0 \sin \frac{\pi x}{a} \sin \frac{\pi y}{b}$. ' q_0 ' is the intensity of loading at center of the plate. ' a ' and ' b ' are the length of and breath of the plate. Deduce the expressions for deflection (w) and moments M_x , M_y , M_{xy}	CO1 16
3.	Find the membrane forces in a cylindrical shell roof subjected to gravity load (self-weight) only.	CO2 14
4.	a. Write short note on i) Lagrange family and serendipity family element ii) Local and global coordinate system iii) Shape function iv) Jacobian matrix b. Write down the convergence requirements of shape functions c. Derive the expression for stiffness matrix. Notations are self-explanatory $[K] = \int B^T D B dv$	CO3 10+5+10=25

5.	Determine the shape functions for constant strain Triangle (CST) element. Use polynomial function of 4 node rectangular element. Use natural coordinate system	CO3 10
6.	Assemble Jacobian matrix and strain displacement matrix corresponding to the Gauss point (0.57735, 0.57735). 	CO3 15
7.	write down the difference between direct and indirect method of model analysis	CO4 5