

B.E. CIVIL ENGINEERING FOURTH YEAR SECOND SEM.**SUPPLEMENTARY EXAM. -2024****Subject: THEORY OF STRUCTURES IV (HONS.) Time: 3 hours****Full Marks 100**

No. of questions	<u>Answer all questions</u>	Marks 20+25+10+ 20+15+10=100
1.	<p>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}</p>	CO1 20
2.	<p>Show that the maximum deflection at the center of a simply supported rectangular plate subjected to a single concentrated load 'P' at center point is</p> $w_{max} = \frac{4P}{\pi^4 abD} \sum_{m=1}^{\infty} \sum_{n=1}^{\infty} \frac{1}{\left(\frac{m^2}{a^2} + \frac{n^2}{b^2}\right)^2}$ <p>Use Navier Solution. 'a' is the length of plate and 'b' is the width of plate. D is the flexural rigidity. 'm' and 'n' are no. of terms.</p>	CO1 25
3.	<p>Derive the basic equations to find the membrane forces of a cylindrical shell roof.</p>	CO2 10

4.	Derive the expression for stiffness matrix. Notations are self-explanatory $[K] = \int B^T D B dv$	CO3 20
5.	Determine the shape function of 4 node rectangular element. Use natural coordinate system	CO3 15
6.	Write down the requirement of model analysis and write down the difference between direct and indirect method of model analysis	CO4 10