GUJARAT TECHNOLOGICAL UNIVERSITY ME – SEMESTER II– EXAMINATION – WINTER - 2016

Su	bject Code: 2722013 Date: 21/11/ 2016	
Su Ti Inst	Subject Name: Plates and ShellsTotal Marks: 70Instructions:Total Marks: 70	
113	 Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks. 	
Q 1 (a)	Enlist all the stress resultants generated in a shell element with proper notations	[03]
Q 1 (b) Q 1 (c)	and meaning. Explain the difference between thin plate and thick plate. Derive the expression for deflection of a simply supported rectangular plate (a x b) subjected to uniformly distributed load of intensity " q_0 " using Navier solution. Also find the value of maximum defection for a square thin plate having 4m x 4m size. Take μ =0.3 and E= 2 x 10 ⁵ N/mm ²	[04] [07]
Q.2 (a) Q.2 (b)	 Give the classification of shell based on shell curvature with neat sketches. Derive N_θ and N_Φ for spherical dome due to self weight and live load. 	[07] [07]
Q.2 (b)	Explain the superiority of curved elements compared to linear.	[07]
Q 3 (a)	Using membrane theory, derive the condition of equilibrium for doubly curved	[07]
Q 3 (b)	Develop basic equation of membrane analysis of a paraboloid of revolution. Give stress function Φ , Z & R if 2a = 20m, 2b = 26m, rise = 2.8m and thickness = 70 mm. OR	[07]
Q 3 (a)	Derive the value of stresses generated in a conical shell under udl and point load	[07]
Q 3 (b)	Explain the membrane solution of elliptic hyperboloids.	[07] [03]
Q 4 (a)	Obtain the equation of deflection for a thin circular plate subjected to concentrated load "P" at the centre. The plate is fixed all around the edges. Also find the maximum deflection in plate if $r = 2$ m. t= 50 mm. u= 0.3 E=200 GPa and P= 50kN	[07]
Q 4 (b)	Explain Finite difference method of solving rectangular shape plate problem. OR	[07]
Q 4 (a)	Explain the boundary conditions of Cantilever plate, simply supported and fixed rectangular plate.	[07]
Q 4 (b)	Explain in short the Levy' Solution and Energy method.	[07]
Q 5 (a)	Derive the expression for the deflection at center for simply supported square plate subjected to hydrostatic pressure.	[07]
Q 5 (b)	Derive the basic fourth order partial differential equation for a plate. Also write down the equation for shear and corner forces.	[07]

- *Q* 5 (*a*) Explain different boundary conditions exist in plate theory with neat sketches and [07] necessary equations.
- *Q 5 (b)* Enlist the various advantages and disadvantages of Navier solution and Levi's [07] Solution.