Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–II EXAMINATION – SUMMER 2015

Subject Code: 2722013 **Date: 01/06/2015**

Subject Name: Plates and Shells

Time: 02:30 PM to 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Figures to the right indicate full marks.**
3. **Make suitable assumptions wherever necessary**

Q 1 (a)	Explain the superiority of curved elements compared to linear.	[07]
Q 1 (b)	Derive the value of stresses generated in a conical shell under udl and point load at crown.	[07]
Q.2 (a)	Using membrane theory, derive the condition of equilibrium for doubly curved surfaces.	[07]
Q.2 (b)	Derive N_{ϕ} and $N_{\bar{u}}$ for spherical dome due to self weight and live load uniformly distributed load.	[07]
	OR	
Q.2 (b)	Find displacement ówô of the crown and at the edge for a circular dome for the following data: ű = 60°, q = 2500 N/m^2, r = 30 m, t = 60 mm, µ = 0.2, E = 2 x 10^5 N/mm^2. Also plot for N_1 and N_2 at the edge and ű = 15°, 30°, 45° & 60°.	[07]
Q 3 (a)	Give the classification of shell based on shell curvature with neat sketches.	[07]
Q 3 (b)	Develop basic equation of membrane analysis of a paraboloid of revolution. Give stress function ū , Z & R if 2a = 20m, 2b = 26m, rise = 2.8m and thickness = 70 mm.	
	OR	
Q 3 (a)	Derive the equation of cylindrical bending in thin isotropic plate with small deflection theory.	[07]
Q 3 (b)	Explain the difference between thin plate and thick plate.	[04]
Q 3 (c)	Enlist all the stress resultants generated in a shell element with proper notations and meaning.	[03]
Q 4 (a)	Derive the expression for deflection of a simply supported rectangular plate (a x b) subjected to uniformly distributed load of intensity ñq_oñ using Navier solution. Also find the value of maximum defection for a square thin plate having 3 m x 3 m size. Take µ=0.3 and E= 2 x 10^5 N/mm^2	[07]
Q 4 (b)	Explain Finite difference method of solving rectangular shape plate problem.	[07]
	OR	
Q 4 (a)	State the equilibrium equation for a plate of constant flexural rigidity óDô in polar coordinates.	[07]
Q 4 (b)	Define Neutral plane, anticlastic, synclastic, inplane resistance, Stiffness factor, Surface and Shell surface.	[07]
Q 5 (a)	Explain different boundary conditions exist in plate theory with neat sketches and necessary equations.	[07]
Q 5 (b)	Derive the basic fourth order partial differential equation for a thin isotropic plate.	[07]
	OR	
Q 5 (a)	Enlist the various advantages and disadvantages of Navier solution and Leviôs Solution.	[07]
Q 5 (b)	Derive the expression for the deflection at center for simply supported square plate subjected to hydrostatic pressure.	[07]