

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER- II(New course) • EXAMINATION (Remedial) – WINTER- 2015

Subject Code: 2722013

Date: 11/12/2015

Subject Name: Plates and shell

Time: 2:30 pm to 5:00 pm

Total Marks: 70

Instructions:

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

Q 1 (a)	Define Neutral plane, anticlastic, synclastic, inplane resistance, Stiffness factor, Surface and Shell surface.	[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)	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 deflection for a square thin plate having 4 m x 4 m size. Take $\mu=0.3$ and $E= 2 \times 10^5 \text{ N/mm}^2$	[07]
Q.2 (b)	Using membrane theory, derive the condition of equilibrium for doubly curved surfaces.	[07]
OR		
Q.2 (b)	Derive equations of equilibrium for general bending theory of uniformly loaded cylindrical shell. Mark important internal stress resultants.	[07]
Q 3 (a)	Give the classification of shell based on shell curvature with neat sketches.	[07]
Q 3 (b)	Explain in short the Levy' Solution and Energy method.	[07]
OR		
Q 3 (a)	Explain the boundary conditions of Cantilever plate, simply supported and fixed rectangular plate.	[07]
Q 3 (b)	Explain the superiority of curved elements compared to linear.	[07]
Q 4 (a)	Derive N_θ and N_ϕ for spherical dome due to self weight and live load uniformly distributed load.	[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 'D' in polar coordinates.	[07]
Q 4 (b)	Explain the membrane solution of elliptic hyperboloids.	[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 Levi's Solution.	[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]