Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–II • EXAMINATION – SUMMER - 2017

Subject Code: 2722013 **Date: 30/05/2017**

Subject Name: Plates and Shells

Time: 02:30 PM To 05:00 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)	Explain the boundary conditions of Cantilever plate, simply supported and fixed rectangular plate.	[07]
Q 1 (b)	A simply supported at (x = 0 and x = L) semicircular cylindrical shell is subjected to a snow load 'q' which is uniformly distributed over its plan area. Given the radius of the shell is 'a', thickness is 'h', modulus of elasticity and Poisson's ratio are E and v respectively, determine the membrane stresses in the shell.	[07]
Q.2 (a)	Give the classification of shell based on shell curvature with neat sketches.	[07]
Q.2 (b)	Derive equations of equilibrium for general bending theory of uniformly loaded cylindrical shell. Mark important internal stress resultants.	[07]
	OR	
Q.2 (b)	Explain Finite difference method of solving rectangular shape plate problem.	[07]
Q 3 (a)	Derive the expression for deflection of a simply supported rectangular plate (a x b) subjected to uniformly distributed load of intensity "q_o" using Navier solution. Also find the value of maximum defection for a square thin plate having 3m x 3m size. Take μ=0.3 and E= 2 x 10^5 N/mm^2	[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 m and thickness = 60 mm.	[07]
	OR	
Q 3 (a)	Define Neutral plane, anticlastic, synclastic, inplane resistance, Stiffness factor, Surface and Shell surface.	[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 μ= 0.3 E=200 GPa and P= 60kN.	[07]
Q 4 (b)	Find displacement 'w' of the crown and at the edge for a circular dome for the following data: φ = 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 φ = 15°, 30°, 45° & 60°.	[07]
	OR	
Q 4 (a)	Explain different boundary conditions exist in plate theory with neat sketches and necessary equations.	[07]
Q 4 (b)	Explain in short the Levy' Solution and Energy method.	[07]
Q 5	Design a multipurpose hall of size 40m X 50m. It is proposed to provide a Hyperbolic shell roof with rise of 3.4 m. Use M25 and Fe 415.	[14]
	OR	
Q 5 (a)	A planetarium dome may be approximated as an edge-supported truncated cone. It is subjected to a snow load with a maximum accumulation over the dome q = 2.8 kPa. Assume that the dome is constructed of 12.5 cm thick concrete having the radii of the parallel circles equal to 45 m at the base and 20 m at the top, respectively. Determine the membrane stresses in the dome.	[07]
Q 5 (b)	Enlist the various advantages and disadvantages of Navier solution and Levi's Solution.	[07]

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