Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
END SEMESTER, MAY 2023

Course: Theory of plates & Shells — **Semester: II**
Program: M. Tech (Structures) — **Time: 3Hrs**
Course Code: CIVL 7012 — **Max. Marks: 100**
Instructions: Attempt all the questions — **PAPER - I**

SECTION A

S. No.		Marks	CO
Q.1	Briefly explain the deflection profile of rectangular loaded plates.	**4**	**CO1**
Q.2	Write max deflections & stress produced in cylindrically plates with clamped edges	**4**	**CO2**
Q.3	Briefly explain membrane theory of shells.	**4**	**CO3**
Q.4	Write equations of equilibrium of shells.	**4**	**CO4**
Q.5	How do you classify shells into long and short shells as per various theories?	**4**	**CO4**

SECTION B

Q.6	Derive the expression for Bending moment & curvature in pure bending of plates	**10**	**CO1**
Q.7	Derive the differential equation for deflection for the symmetrical bending of a circular plate with lateral loads of the type $\frac{d^3w}{dr^3}+\frac{1}{r}\frac{d^2w}{dr^2}-\frac{1}{r^2}\frac{dw}{dr}=\frac{q}{d}$ where Q= shear force, q = Intensity of loading, r = radius of plate, D = flexural rigidity of plate	**10**	**CO2**
Q.8	A cylindrical shell subject to UDL (Self-weight + imposed load). Derive the expression for $N\phi$, Nx & $Nx\phi$	**10**	**CO3**
Q.9	Calculate the membrane stress at central span, quarter span & end section for a cylindrical shell of 20m span,10m radius & semi vertex angle 45^0. Shell is 90mm thick & subjected to all-inclusive UDL of 2.5kN/m^2 **OR** Derive the expression for equations of equilibrium of a shell	**10**	**CO4**

SECTION-C

Q.10	A spherical dome of 15m radius & rise 4m carries an all-inclusive load of 3kN/m^2. Calculate the various stresses developed in the shells due to this load.	**20**	**CO3**
Q.11	A simply supported rectangular plate of dimension a x b x h is subjected to load ‘P’ acting over an area u x v. Derive the expression for deflection. Adopt Navier’s approach. **OR** Derive expressions for deflection, shear force and bending moment for a circular plate with simply supported boundary conditions subjected to uniformly distributed loading.	**20**	**CO2**