

Name:	 UPES UNIVERSITY WITH A PURPOSE
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
END SEMESTER, JUNE-JULY 2020

Course: Theory of plates & Shells
Program: M. Tech (Structures)
Course Code: CIVL 7012
Instructions: Attempt all the questions

Semester: II
Time: 3Hrs
Max. Marks: 100
PAPER - I

SECTION A

S. No.	Question	Marks	CO
Q.1	Briefly explain the deflection profile of rectangular loaded plates.	4	CO1
Q.2	Write max deflections & stress produced in cylindrical 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_ϕ, N_x & $N_{x\phi}$	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° . 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