

Name:
Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
END Semester Examination MAY 2019

Course Name: Theory of plates & shells
Program: M. Tech (Structural Engg)
Time: 03 hrs.
Instructions: Answer all the questions

Semester: II
Max. Marks: 100
Course Code: CIVL 7012

SECTION A

S. No.		Marks	CO
Q.1	Briefly explain the deflection profile of rectangular loaded plates.	5M	CO1
Q.2	Write max deflections & stress produced in cylindrical plates with Built in edges.	5M	CO2
Q.3	Explain difference between bending theory & membrane theory of shells.	5M	CO3
Q.4	Write equations of equilibrium of shells.	5M	CO4

SECTION B

Q.5	Derive the deflection of uniformly loaded circular plate subjected to loading of intensity “q”.	10M	CO1
Q.6	Derive the differential equation for deflection for the symmetrical bending of a circular plate with lateral loads of the type $\frac{d^3 w}{dr^3} + \frac{1}{r} \frac{d^2 w}{dr^2} - \frac{1}{r^2} \frac{dw}{dr} = \frac{Q}{D}$. Where Q = $\int_0^r q r dr$. total shear force on the plate = $\int_0^r q r dr$, q = intensity of lateral loading, r = radius, D = Flexural rigidity of the plate	10M	CO2
Q.7	Derive the expression for conditions of equilibrium for shells of revolution.	10M	CO3
Q.8	Derive the expression for equations of equilibrium of a shell OR A conical tank filled with liquid of density ϑ subjects to lateral forces that symmetrically distributes over conical surface. Obtain the expression for N_ϕ, N_θ & calculate the values	10M 10M	CO4 CO4

SECTION-C

Q.9	Derive the expression for deflection & bending of rectangular loaded plate with one end fixed & other end simply supported	20M	CO2
Q.10	Derive the expression for deflection & Bending moment of a cylindrical tank using shell theory OR Derive the boundary conditions for simply supported cylindrical shells with the edge conditions or the end shells in a multiple group of shells.	20M	

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SECTION A

S. No.		Marks	CO
Q.1	Write the Expression for deflection & slope of circular plate subjected to UDL.	5M	CO1
Q.2	Write down the curvature relationship of plate in arbitrary plane along x & y plane	5M	CO2
Q.3	Briefly discuss various classification of shells.	5M	CO3
Q.4	What are the probable loads that can come on shells during its serviceability span	5M	CO4

SECTION B

Q.5	Derive the expression for Bending moment & curvature in pure bending of plates.	10M	CO1
Q.6	A simply supported rectangular plate subjects to loading of Sine wave. Derive the expression for deflection & Bending moment. Adopt Navier's approach.	10M	CO2
Q.7	A horizontal circular pipe filled with liquid & simply supported at the ends with the pressure P_0 at the axis of the tube. Length of tube is L & radius "a". Calculate the values of membrane forces.	10M	CO3
Q.8	A cylindrical shell subject to UDL (Self-weight + imposed load). Derive the expression for $N_\phi, N_x \wedge N_{x\phi}$	10M	CO4
	OR Calculate the membrane stress at central span, quarter span & end section for a cylindrical shell of 22m span, 10m radius & semi vertex angle 40° . Shell is 80mm thick & subjected to all-inclusive UDL of 3kN/m^2	10M	CO4

SECTION-C

Q.9	Derive the expression for deflection & bending of rectangular loaded plate with partially fixed built in edges	20M	CO2
Q.10	Derive the deflection & bending of cylindrical tank with non- uniform thickness.		
	OR 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.	20M	CO3