

GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL (STRUCTURAL ENGINEERING) (20)

PLATES AND SHELL

SUBJECT CODE: 2722013

SEMESTER: II

Type of course: Elective

Prerequisite: Mechanics of Solids, Structural Analysis and Engineering Mathematics

Rationale:

Plates and Shells have become important structural forms of modern infrastructures. Analysis of such structure requires rigorous mathematical treatment. It is essential to understand structural behaviour and analysis of plates and shells for their safe design. The course on *Plates and Shell* equips the students with analysis methodology of plates and shell using analytical methods.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		Theory Marks		Practical Marks				
			ESE (E)	PA (M)	ESE (V)		PA (I)			
					ESE	OEP	PA	RP		
3	2#	0	4	70	30	30	0	10	10	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction to thin plates, small deflection theory, plate equation. Isotropic and orthotropic plates, bending and twisting of plates, Navier's solution, Levy's solution and energy method, rectangular, circular plates with variable rigidity in Cartesian and polar co-ordinates, Numerical solutions.	21	50
2	Shell behaviour, shell surfaces and characteristics, classification of shells equilibrium equations in curvilinear co-ordinates. Stress-strain & force displacement relations. Membrane analysis of shells of revolution and cylindrical shells under different loads. Shallow shells, membrane solution of elliptic paraboloids and hyperboloids. Solution of some typical problems. Introducing to stability of plates and stiffened plates.	21	50

Reference Books:

1. Theory of plates and shells - Timoshenko
2. Theory & analysis of plate - Classical & Numerical methods - Szilard
3. Design & construction of concrete shell roofs - Ramaswamy, G. S.
4. Theory of cylindrical shells - Glibson J. E.
5. A text book of plate Analysis- N. K. Bairagi
6. Shell Analysis - N. K. Bairagi

Course Outcome:

After learning the course the students should be able to:

- (a) identify, formulate and solve theoretical problems with structural plate and shell,
- (b) understand behaviour of plates under bending and twisting,
- (c) analyse shells under different loading conditions,
- (d) know type of shell and present force-displacement relationship.

List of Open Source Software/learning website:

<http://ocw.mit.edu/courses/mechanical-engineering/2-081j-plates-and-shells-spring-2007/>

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website