



## DEPARTMENT OF CIVIL ENGINEERING

### NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
<b>Name of the programme and specialization</b>	<b>M. Tech. Structural Engineering</b>		
<b>Course Title</b>	Theory of Plates and Shells		
<b>Course Code</b>	CE656	<b>No. of Credits</b>	4
<b>Course Code of Pre-requisite subject(s)</b>			
<b>Session</b>	January 2021	<b>Section (if, applicable)</b>	N/A
<b>Name of Faculty</b>	Dr. Raghavan R	<b>Department</b>	Civil Engineering
<b>Email</b>	raghavanr@nitt.edu	<b>Telephone No.</b>	9940449658
<b>Name of Course Coordinator(s) (if, applicable)</b>			
<b>E-mail</b>		<b>Telephone No.</b>	
<b>Course Type</b>	<input checked="" type="checkbox"/> <b>Core course</b> <input type="checkbox"/> <b>Elective course</b>		
<b>Syllabus (approved in BoS)</b>			
<p>Thin plates with small deflection; assumptions, governing differential equations and various boundary conditions.</p> <p>Simply supported rectangular plates - Navier solution with various types of loads, rectangular plates with various boundary conditions - Levy's method, Axi-symmetric circular plates.</p> <p>Approximate methods for plates like finite difference and energy methods.</p> <p>Shells: structural behavior, classification, translational and rotational shells- hyperbolic paraboloid- elliptic paraboloid- Gaussian curvature.</p> <p>Membrane theory of shells- cylindrical shells- shells of revolution.</p>			
<b>COURSE OBJECTIVES</b>			
<ol style="list-style-type: none"> <li>1. To introduce the concept of plate theory.</li> <li>2. To study the behaviour and analysis of thin plates.</li> <li>3. To study the procedure for rectangular plates and circular plates subjected to lateral loads.</li> <li>4. To study the classification and behaviour of shells.</li> <li>5. To study the membrane analysis of shells.</li> </ol>			

<b>COURSE OUTCOMES (CO)</b>	
<b>Course Outcomes</b>	<b>Aligned Programme Outcomes (PO)</b>
At the end of the course student will be able to	
1. assess the strength of thin plates under different types of loads.	i ii iii v vi xi xii
2. analyze thin plates using Navier's method and Levy's method.	i ii iii v vi xi xii
3. analyse circular plates under axi-symmetric deflection.	i ii iii v vi xi xii
4. classify different types of shells and study their behavior.	i ii iii v vi xi xii
5. analyze shells using membrane theory.	i ii iii v vi xi xii

<b>COURSE PLAN – PART II</b>			
<b>COURSE OVERVIEW</b>			
<ul style="list-style-type: none"> <li>This is a 4 Credit course offered to 2<sup>nd</sup> semester Structural Engineering M.Tech. students</li> <li>Four theory classes (4 hours) will be conducted per week</li> </ul>			
<b>COURSE TEACHING AND LEARNING ACTIVITIES</b>			
<b>S.No.</b>	<b>Week/Contact Hours</b>	<b>Topic</b>	<b>Mode of Delivery</b>
1.	Week 1	Introduction to plates – Cylindrical bending in thin plates	PPT
2.	Week 2	Kirchhoff's plate bending theory – Free edge boundary condition – Strain energy in thin plates	PPT
3.	Week 3	Classical methods for thin rectangular plates – Navier's method	PPT/Tutorial
4.	Week 4	Levy's method	PPT/Tutorial
5.	Week 5	Introduction to variational methods – Ritz method	PPT
6.	Week 6	Galerkin method – Kantorovich method	PPT
7.	Week 7	Analysis of circular plates using axisymmetry principle	PPT/Tutorial
8.	Week 8	Stability of thin plates – critical loads in uniaxial loading	PPT
9.	Week 9	Critical loads for shear buckling – application in steel design codebooks	PPT
10.	Week 10	Orthotropic plates (overview) – Mindlin Reissner theory for thick plates (overview)	PPT
11.	Week 11	Shells classification and behaviour – Gaussian curvature – membrane theory of shells	PPT
12.	Week 12	Bending theory of shells	PPT
13.	Week 13	Higher order shell theories (only theory)	PPT

14.	Week 14	Membrane analysis of shells	PPT/Tutorial
15.	Week 15	Design of shells of revolution by membrane theory	PPT/Tutorial
16.	Week 16	Presentation of the course project work	PPT (students)

**COURSE ASSESSMENT METHODS (shall range from 4 to 6)**

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Midterm Assessment	Week 8	2 hours	30
2.	Regular Homework	-	-	20
3.	Software/programming project	Week 16	-	20
4.	Compensation assessment (for Students who have missed midterm for genuine reasons)	Week 15	2 hours	30
5.	Final Assessment	Week 16	2 hours	30

**COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)**

It is proposed to take feedback from the students, at the end of the semester to evaluate the execution of the course

**COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)**

**Attendance**

- The Closing date of attendance for the subject is Week 15.
- 100% attendance is desirable for every student, with minimum attendance being 75%.
- Attendance during each assessment is mandatory.
- Compensation assessment would only be given to those students who have missed either midterm assessment on genuine grounds. The portions of the retest would include the portions for midterm assessment.

**Marks**

- Eligibility criteria for passing
- Passing minimum of midterm assessment + homework + project + final assessment is 40%

**MODE OF CORRESPONDENCE (email/ phone etc)**

Email: [raghavanr@nitt.edu](mailto:raghavanr@nitt.edu)

Phone: 9940449658

**COMPENSATION ASSESSMENT POLICY**

One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.

**ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)**

**At least 75% attendance in each course is mandatory.**

**A maximum of 10% shall be allowed under On Duty (OD) category.**

Students with **less than 65% of attendance** shall be prevented from writing the final

assessment and **shall be awarded 'V' grade.**

### **ACADEMIC DISHONESTY & PLAGIARISM**

Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.

Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.

The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

The above policy against academic dishonesty shall be applicable for all the programmes.

### **ADDITIONAL INFORMATION**

- The Course Coordinator is available for consultation during office hours.
- Queries, if any, can also be emailed to the Course Coordinator directly at [raghavanr@nitt.edu](mailto:raghavanr@nitt.edu).

### **FOR APPROVAL**

*R. Raghavan*

Raghavan R

Course Faculty

*[Signature]*

CC-Chairperson

*[Signature]*

Head  
Department of Civil Engineering  
National Institute of Technology  
Tiruchirappalli - 620 015.

HOD

### **Guidelines:**

6. The number of assessments for a course shall range from 4 to 6.
7. **Every course shall have a final assessment on the entire syllabus with at least 30% weightage.**
8. **One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.**
9. **The passing minimum shall be as per the regulations.**

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or class average/2 whichever is greater.		Peak/3 or class average/2 whichever is lower		40%

**10. Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.**

**11. Absolute grading policy shall be incorporated if the number of students per course is less than 10.**

12. Necessary care shall be taken to ensure that the course plan is reasonable and is objective.