



DEPARTMENT OF CIVIL ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	M.TECH STRUCTURAL ENGINEERING		
Course Title	MATRIX METHODS OF STRUCTURAL ANALYSIS		
Course Code	CE653	No. of Credits	3
Course Code of Pre-requisite subject(s)	NA		
Session	July / January <u>2021</u>	Section (if, applicable)	NA
Name of Faculty	DR. K. BASKAR	Department	CIVIL ENGINEERING
Official Email	kbaskar@nitt.edu	Telephone No.	2503161
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	<input checked="" type="checkbox"/> Core course		
Syllabus (approved in Senate)			
<p>Generalized measurements - Degrees of freedom - Constrained measurements - Behavior of structures - Principle of superposition - Stiffness and flexibility matrices in single, two and n-co-ordinates - structures with constrained measurements.</p> <p>Stiffness and flexibility matrices from strain energy - Betti's law and its applications- Determinate and indeterminate structures - Transformation of element matrices to system matrices - Transformation of system vectors to element vectors.</p> <p>Flexibility method applied to statically determinate and indeterminate structures – Choice of redundant - Transformation of redundant - Internal forces due to thermal expansion and lack of fit.</p> <p>Stiffness method - Internal forces due to thermal expansion and lack of fit - Application to symmetrical structures - Comparison between stiffness and flexibility methods.</p> <p>Analysis of substructures using the stiffness method and flexibility method with tri-diagonalization - Analysis by Iteration method - frames with prismatic members - non-prismatic members.</p>			
COURSE OBJECTIVES			
<ol style="list-style-type: none"> 1. To introduce the classical, matrix and finite element methods of structural analysis. 2. To make students understand structural behaviour. 3. To enable students to analyze determinate and indeterminate structures. 			



4. To familiarize students with displacement method.	
5. To expose students to analysis of substructures.	
MAPPING OF COs with POs	
Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. To understand energy concepts in structures, characteristics of structures, transformation of information in structures.	1, 2, 3, 4, 5
2. To perform analysis by iteration method and determine deflection of structures using Maxwell-Betti Law of Reciprocal Deflections.	1, 2, 3, 4, 5
3. To understand generalized and constrained measurements	1, 2, 3, 4, 5
4. To apply principle of superposition in practical problems	1, 2, 3, 4, 5
5. To understand fundamental relationships for structural analysis and develop analytical models.	1, 2, 3, 4, 5

COURSE PLAN – PART II			
COURSE OVERVIEW			
This course will introduce the computer methods of structural analysis to the students. Concepts of flexibility and stiffness approach will be discussed. Stiffness and flexibility matrices from Strian energy will be discussed. Both the methods will be applied to the structural systems made with discrete elements and Students can be able to apply in equilibrium/compatibility equations and can solve for unknowns.			
COURSE TEACHING AND LEARNING ACTIVITIES			(Add more rows)
S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	8	Generalized measurements - Degrees of freedom - Constrained measurements - Behavior of structures - Principle of superposition - Stiffness and flexibility matrices in single, two and n-coordinates - structures with constrained measurements.	PPT and other softcopy of course materials during online classes.
2	8	Stiffness and flexibility matrices from strain energy - Betti's law and its applications- Determinate and indeterminate structures - Transformation of element matrices to system matrices - Transformation of system vectors to element vectors.	PPT and other softcopy of course materials during online classes.



3	8	Flexibility method applied to statically determinate and indeterminate structures – Choice of redundant - Transformation of redundant - Internal forces due to thermal expansion and lack of fit.	PPT and other softcopy of course materials during online classes.
4	8	Stiffness method - Internal forces due to thermal expansion and lack of fit - Application to symmetrical structures - Comparison between stiffness and flexibility methods.	PPT and other softcopy of course materials during online classes.
5	8	Analysis of substructures using the stiffness method and flexibility method with tri-diagonalization - Analysis by Iteration method - frames with prismatic members - non-prismatic members.	PPT and other softcopy of course materials during online classes.

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assignment	At the end of each chapter	NA	20
2	Online quizzes / Seminar Presentation	At the end of each chapter	20 Minutes each	20
3	Mid Semester Assessment	End of chapter 1,2,3	2 hours	30
CPA	Compensation Assessment*	14 th week	2 hour	30
4	Final Assessment*	As per Institute Schedule	2 hours	30

*mandatory;

COURSE EXIT SURVEY

course feedback will be collected from students and will be evaluated to re-design the course.

COURSE POLICY (including compensation assessment to be specified)

1. Assessment-1, 2, 3 and 4 are compulsory.
2. Only for genuine cases (with prior information and approval) Compensation Assessment will be conducted.
3. Institute Norms will be followed for fixing pass marks



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.

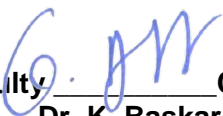
ACADEMIC DISHONESTY & PLAGIARISM

- 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, IF ANY

FOR APPROVAL

Course Faculty


Dr. K. Baskar

CC- Chairperson


Dr. Deendayal

HOD


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

Dr. G. Swaminathan



Guidelines

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- d) 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%

- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.