DEPARTMENT OF CIVIL ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech. Civil Engineering		
Course Title	STRUCTURAL SYSTEM ANALYSIS		
Course Code	CEPE14	No. of Credits	3
Course Code of Pre-requisite subject(s)	CEPE14		
Session	July 2018	Section (if, applicable)	-
Name of Faculty	Dr.P. Jayabalan	Department	Civil Engineering
Email	pjeya@nitt.edu	Telephone No.	0431-2503157
Name of Course Coordinator(s) (if, applicable)	-		
E-mail		Telephone No.	
Course Type	☐ Core course	☑ Elective course	

Syllabus (approved in BoS)

Generalized measurements - Degrees of freedom - Constrained Measurements - Behavior of structures - Principle of superposition. Stiffness and flexibility matrices - Constrained measurements - Stiffness and flexibility coefficients from virtual work.

Strain energy - Stiffness and flexibility matrices from strain energy - Symmetry and other properties of stiffness and flexibility matrices - Betti's law and its applications - Strain energy in systems and in elements.

Determinate and indeterminate structures - Transformation of element matrices to system matrices - Transformation of system vectors to element vectors - Normal coordinates and orthogonal transformations.

Flexibility method applied to statically determinate and indeterminate structures - Choice of redundants - Transformation of redundants - Internal forces due to thermal expansion and lack of fit.

Development of the method - Internal forces due to thermal expansion and lack of fit - Application to symmetrical structures - Comparison between stiffness and flexibility methods.

***Note**: Assignments include the design and drawings of various steel structures.*

COURSE OBJECTIVES
1. To understand the importance of degrees of freedom and the concept pf principle of superposition
2. To know about the concept of strain energy and principle work
3. To study the transformation of system matrices and element matrices for the determinate and indeterminate structures
4. To analyze the forces in structures like continuous beam, truss and frames using stiffness and flexibility method

COURSE OUTCOMES (CO)	
Course Outcomes	**Aligned Programme Outcomes (PO)**
1. Apply the basic concepts of matrix methods of structural analysis	a,b,c,d
2. Develop flexibility and stiffness matrices	a,b,c,d
3. Analyze the structures using flexibility and stiffness methods	a,b,c,d
4. Transform system coordinates to element coordinates	a,b,c,d,g
5. Determine the forces in various members due to lack of fit and thermal expansion.	a,b,c,d,g,k,f

COURSE PLAN – PART II			
COURSE OVERVIEW			
COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	**Contact Hours**	**Topic**	**Mode of Delivery**
1	1	Introduction and review of earlier methods	Lecture / PPT
2	2,3	Behaviour of structures	Lecture / PPT
3	4	Generalised measurements	Lecture / PPT
4	5,6	Degrees of Freedom, constrained measurements	Lecture / PPT
5	7 to11	Principle of superposition, Stiffness and flexibility matrices in single, multiple co-ordinates	Lecture / PPT
6	12,13	Stiffness and flexibility matrices from strain energy	Lecture / PPT
7	14	Betti's law and its applications	Lecture / PPT
8	15 to 17	Transformation of element matrices to system matrices, Transformation of system vectors to element vectors	Lecture / PPT

9	18,19	Flexibility method applied to statically determinate and indeterminate structures	Lecture / PPT
10	20,21	Choice of redundant , Transformation of redundant	Lecture / PPT
11	22 to 26	Internal forces due to thermal expansion and lack of fit	Lecture / PPT
12	27 to 31	Displacement method , Internal forces due to thermal expansion and lack of fit	Lecture / PPT
13	33,34	Application to symmetrical structures	Lecture / PPT
14	35,36	Comparison between stiffness and flexibility methods	Lecture / PPT

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment 1	Week 7	1 Hour	20
2	Assessment -2	Week 15	1 Hour	20
3	Assignment/Tutorials/Surprise Quiz (40% weightage)	-	-	10
CPA	Compensation Assessment*	Week 18	1 Hour	Corresponding Weightage
6	Final Assessment *	Week 19	3 Hours	50

*Minimum Pass mark has to be fixed as per Institute Policy.

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

- Feedback from students will be obtained through MIS.

COURSE POLICY (preferred mode of correspondence with students, policy on attendance, compensation assessment, academic honesty and plagiarism etc.)

MODE OF CORRESPONDENCE (email/ phone etc)

All the students are advised to attend the class regularly. All the correspondence (schedule of classes/ schedule of assessment/ course material/any other information regarding this course) will be intimated in the Class only.

ATTENDANCE

1. Attendance will be taken by the faculty in all the contact hours. Every student should maintain **minimum of 75 % physical attendance** in these contact hours.
2. **A maximum of 10% shall be allowed under On Duty (OD) category**
3. Students with **less than 65% of attendance** shall be prevented from writing the final assessment and shall be awarded '**V' grade.**

COMPENSATION ASSESSMENT

- If any student is not able to attend any of the internal assessments due to genuine reason, the student is permitted to attend compensatory assessment with 20% weightage.

ACADEMIC HONESTY & 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

1. The faculty is available for consultation at times as per the intimation given by the faculty.
2. Queries (if required) to the course teacher shall only be emailed to the email id specified by the teacher(pjeya@nitt.edu)

FOR APPROVAL

Course Faculty _____ **CC-Chairperson** _____ **HOD** _____