SCHEME OF COURSE WORK

Course Details:

Course Title	**: Advanced Methods of Structural Analysis**		
Course Code	**: 15CE2204**	**L P C**	**: 3 0 3**
Program:	**: M. Tech.**		
Specialization:	**: Structural Engineering**		
Semester	**: I**		
Prerequisites	**: Strength of Materials, Structural Analysis, Finite Element Methods.**		
Courses to which it is a prerequisite	**: None**		

Course Outcomes (COs):

At the end of the course, the student will be able to:

1	Know the type of non-linearity and its analysis.
2	Analyse beams and building frames by stiffness method.
3	Apply the concept of ILDs for beams and trusses.
4	Analyse cables and suspension bridges.
5	Apply Rayleigh Ritz method and Galerkin's method for beams and bars.

Program Outcomes (POs):

Post graduates will be able to:

1	Synthesize existing and new knowledge in various sub areas of structural engineering
2	Analyse complex engineering problems critically with adequate theoretical background for practical applications.
3	Evaluate a wide range of feasible and optimal solutions after considering safety and environmental factors.
4	Demonstrate the ability to pursue research by conducting experiments and extract the relevant information through literature surveys.
5	Use state –of- the- art of modern tools for interpreting the behaviour and modeling of complex engineering structures.
6	Attain the capability to work in multi-disciplinary teams to achieve common goals.
7	Demonstrate the knowledge to perform the projects efficiently in multi-disciplinary environments after consideration of economical and financial matters.
8	Communicate effectively on complex engineering activities to prepare reports and make presentations.
9	Engage in life-long learning independently to improve knowledge.
10	Understand the responsibility of carrying out professional practices ethically for sustainable development of society.
11	Examine critically and independently one's actions and take corrective measures by learning from mistakes.

Course Outcome versus Program Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO-1	S	S	M	M							
CO-2	S	S	M	M							
CO-3	S	S	M	M							
CO-4	S	S		M							
CO-5	S	S	S	M	S						

S - Strongly correlated, M - Moderately correlated, *Blank - No correlation*

Assessment Methods:	Assignment / Seminar / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week No.	**TOPIC / CONTENTS**	**Course Outcomes**	**Sample questions**	**TEACHING-LEARNING STRATEGY**	**Assessment Method & Schedule**
1	Non-Linear Analysis: Introduction, types of non-linearity,	CO-1	What is meant by non-linearity and explain in detail with different types?	▫ Lecture/ Discussion	
2	Methods of non-linearity	CO-1	What are the different methods of non-linearity explain in detail with neat diagrams?	▫ Lecture/ Discussion	
3	Analysis of material non-linear problems	CO-1	Explain in detail about material non-linear problems.	▫ Lecture/ Discussion	
4	Analysis of geometric non-linear problems	CO-1	Explain in detail about geometric non-linear problems.	▫ Lecture/ Discussion	Assignment
5	Formulation of stiffness matrix for the indeterminate beam system	CO-2	Analyse the given indeterminate beams by stiffness method	▫ Lecture ▫ Problem solving	

6	Formulation of stiffness matrix for the frame system Solve the frames by stiffness method	CO-2	Analyse the given frame by stiffness method	▫ Lecture ▫ Problem solving	
7	Formulation of stiffness matrix for the truss system Solve the trusses by stiffness method	CO-2	Formulate the stiffness matrix for the given truss system Analyse the given truss by stiffness method	▫ Lecture ▫ Lecture ▫ Problem solving	Assignment
8	Introduction to influence lines Analysis of indeterminate beams by influence lines	CO-3	Analysis the given continuous beams by using influence lines methods	▫ Lecture Problem solving	
9	**MID TEST - I**				
10	Analysis of three Arches hinged influence lines by	CO-3	Analysis the given three hinged arches by using influence lines methods	▫ Lecture Problem solving	
11	Analysis of two hinged arches by influence lines	CO-3	Analysis the given two hinged arches by using influence lines methods	▫ Lecture Problem solving	Assignment
12	Introduction, Equation of the cable, General Cable theorem	CO-4	Derive the equation of the cable	▫ Lecture Problem solving	
13	Horizontal reaction for uniformly loaded cable, Tension in the cable supported at same and different levels	CO-4	Calculate the horizontal reaction of the cable subjected to UDL	▫ Lecture Problem solving	
14	Lengths of the cable when supported at the same level.	CO-4	Calculate the lengths of the cable	▫ Lecture Problem solving	Assignment
15	Analysis of axially loaded bars by Rayleigh Ritz method.	CO-5	Calculate the stresses of a axially loaded bar usin Rayleigh Ritz g method.	▫ Lecture Problem solving	
16	Analysis of axially loaded beams by Rayleigh Ritz method.	CO-5	Calculate the stresses of a axially loaded beam usin Rayleigh Ritz g method.	▫ Lecture Problem solving	
17	Analysis of axially loaded bars and beams by Gelarkin's method.	CO-5	Calculate the stresses of a axially loaded bar usin Gelarkin's method. g	▫ Lecture Problem solving	Assignment
18	**MID TEST - II**				
	END EXAM				