SWARNANDHRA
COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

Accredited by National Board of Accreditation, AICTE, New Delhi, Accredited by NAAC with "A" Grade – 3.32 CGPA, Recognized under 2(f) & 12(B) of UGC Act 1956, Approved by AICTE, New Delhi, Permanent Affiliation to JNTUK, Kakinada
Seetharampuram, W.G.DT., Narsapur-534280, (Andhra Pradesh)

DEPARTMENT OF CIVIL ENGINEERIG

TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods /Week	Academic Year	Date of commencement of Semester
20CE5E01	ADVANCED STRUCTURAL ANALYSIS	V	CIVIL	6	2023-24	03-07-2023

COURSE OUTCOMES

Students are able to

1	Determine unknowns in a structures using flexibility method. **K3]**
2	Analyze structures using stiffness methods.**[K3]**
3	Explain plane stress & plane strain in theory of elasticity.**[K2]**
4	Solve multiple degrees of freedom of two dimensional problems in rectangular co- ordinates.**[K3]**
5	Discuss dynamic loadings and free vibrations in a structure **[K2]**

UNIT	Out Comes / Bloom's Level	Topics No.	Topics/Activity	Text Book / Reference	Contact Hour	Delivery Method
			I. Flexibilty Method			
1	Determine unknowns in a structures using flexibility method. **K3]**	1.1	Introduction	T1	01	Chalk & Board, PPT
		1.2	Basic method (Conjugate Beam method)	T1	01	
		1.3	Flexibility Matrix Formation	T1	01	
		1.4	Step by Step procedure	T1	01	
		1.5	Applications to continuous beam (maximum of 2 unknowns)	T1	02	
		1.6	Applications to continuous beam with overhanging (maximum of 2 unknowns)	T1	02	
		1.7	Applications to continuous beam with sinking of supports (maximum of 2 unknowns)	T1	02	
				Total	**10**	
			II. Stiffness Method			
2	Analyze structures using stiffness methods. **[K3]**	2.1	Introduction	T1	01	Chalk & Board, PPT, video
		2.2	Basic method (Slope Deflection method)	T1	01	
		2.3	Stiffness Matrix Formation	T1	01	
			Step by Step procedure	T1	01	
		2.4	Applications to continuous beam (maximum of 2 unknowns)	T3	02	
		2.5	Applications to continuous beam with overhanging (maximum of 2 unknowns)	T3	02	
		2.6	Applications to continuous beam with sinking of supports (maximum of 2 unknowns)	T3	02	
				Total	**10**	

		III. Introduction to theory of elasticity				
3	Explain plane stress & plane strain in theory of elasticity. **[K2]**	3.1	Introduction	T2	01	Chalk & Board, PPT, video
		3.2	Notations for forces and stresses, ,	T2	01	
		3.3	components of stresses and components of strain	T2	01	
		3.4	Hooke's law.	T2	02	
		3.5	**Plane stress and plane strain:** Definitions	R2	01	
		3.6	differential equations of equilibrium	R2	02	
		3.7	Boundary conditions and compatibility equations.	R2	02	
				Total	**10**	
		IV. Two dimensional problems in rectangular co-ordinates:				
4	Solve multiple degrees of freedom of two dimensional problems in rectangular co-ordinates.**[K3]**	4.1	**Introduction**	T2	01	Chalk & Board, PPT, video
		4.2	Airy stress function	T2	02	
		4.3	solution by polynomials	T2	02	
		4.4	Problems on polynomials	T2	02	
		4.5	saint venant principle	T2	01	
		4.6	Solution of bi-harmonic equation using Fourier series.	T2	02	
		4.7	Problems on rectangular coordinates	T2	02	
				Total	**12**	
		V. Introduction to structural dynamics				
5	Discuss dynamic loadings and free vibrations in a structure **[K2]**	5.1	**Introduction**	R2	01	Chalk & Board, PPT, video
		5.2	Dynamic loadings, formulation of equation of motion	R2	02	
		5.3	Newton's second law of motion, D'Alembert's principle	R2	01	
		5.4	solution of undamped single degree of freedom system.	R2	02	
		5.5	**Free Vibrations:** Damped single degree of freedom system	R3	01	
		5.6	Viscous damping, equation of motion	R3	02	
		5.7	critically damped, over damped and under damped system	R3	02	
		5.8	logarithmic decrement	R3	01	
				Total	**12**	
			CUMULATIVE PROPOSED PERIODS		**54**	

Text Books:

S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	Dr. P. Dayaratnam , Advanced structural analysis, Tata McGraw hill publishing company Limited, 2015.
2	Timoshenko and Goodier , Theory of Elasticity by, McGraw Hill Book Company, New Delhi, 2015.

3	Robert E Sennet , Matrix analysis of structures- Prentice Hall-Englewood cliffs-New Jercy, 2014
Reference Books:	
S.No.	**AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION**
1	sadhu singh , Theory of Elasticity, Khanna Publishers, 2015.
2	Mario Paz , Structural Dynamics, CBS Publishers, New Delhi, 2014.
3	A.K.Chopra , Dynamics of structures, Prentice Hall of India, 2014.
Web Details	
1	https://nptel.ac.in/courses/105106050 .

		Name	Signature with Date
i.	Faculty	A. Venkata Krishna	03/07/23
ii.	Course Coordinator	A. Venkata Krishna	03/07/23
iii.	Module Coordinator	A. Venkata Krishna	03/07/23
iv.	Programme Coordinator	A. Venkata Krishna	i/c 03/07/23

Principal