DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE
(AUTONOMOUS)
(Approved by AICTE & Affiliated to Anna University, Chennai)
Re-Accredited with 'A' Grade by NAAC, Accredited by TCS
Accredited by NBA – BME, ECE & EEE
PERAMBALUR - 621 212. Tamil Nadu.
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COURSE PLAN

Course Code/Name	U23CET41/ Strength of Materials – II			
Year/Section/Department	II/-/ Civil Engineering			
Credits Details	L: 3	T:0	P:0	C: 3
Total Contact Hours Required	45			

Syllabus:

UNIT I/ COMPRESSION MEMBERS	**No. Of Periods: 9**
Column: Types- Modes of failure-Buckling Load-Factor of safety- Euler's theory- Different end conditions Rankine's-Gordon formula. Axial and eccentric loads- Direct, bending and combined bending stress Calculation of combined bending stress: Core section- Middle third and Middle fourth rule.	
UNIT II/ DEFLECTION OF DETERMINATE BEAMS	**No. Of Periods: 9**
Governing differential equation-Elastic curve for various types of beams-Slope and deflection Macaulay's method- Moment area method- Conjugate beam method.	
UNIT III/ CYLINDERS	**No. Of Periods: 9**
Thin cylinder: Circumferential and longitudinal stress- Shear stress- Volumetric strain. Thick cylinder: Lame's equation- Hoop and radial stress distribution- Compound cylinders.	
UNIT IV/ PRINCIPAL STRESS AND THEORIES OF ELASTIC FAILURE	**No. Of Periods: 9**
Two-dimensional state of stress at a point-Normal and shear stresses: Analytical method. Theories of failure: Maximum principal stress theory- Maximum shear stress theory- Maximum principal strain theory- Strain energy theory- Maximum shear strain energy theory-Simple Problems.	
UNIT V/ ANALYSIS OF PLANE MEMBERS	**No. Of Periods: 9**
Elements and types of a truss-Determinacy and stability- Analysis of statically determinate plane truss: Method of joints-Method of sections- Method of tension coefficient.	

Objective:

- To analyze the column with different end conditions.
- To study the different methods of finding deflection of beam.
- To analyze the stress in thick and thick cylinders.
- To calculate the theories of failure.
- To analyze the plane members.

Text Book:

T1: Rajput R.K. "Strength of Materials", S.Chand and Co, New Delhi, 2014.
T2: Bansal R.K, "Strength of Materials", Laxmi Publications, New Delhi, 2017.

Website:

W1:Calculation of bending stresses https://pressbooks.bccampus.ca/powr4406/chapter/bending-moment-stress/
W2:Deflection of Determinate Beams (https://learnaboutstructures.com/Deflections-of-Determinate-Structures

Online Mode of Study:

- http://nptel.ac.in/noc22-ce46/preview
- http://nptel.ac.in/courses/105/104/105104160/
- http://onlinecourses-archieve.nptel.ac.in/noc17_ce17

Course Plan:

Topic Number	Topic	Reference Detail	Page Number	Mode of teaching	Number of Periods Required	Cumulative Period
UNIT I - COMPRESSION MEMBERS						
1	Column: Types- Modes of failure	T1	775-776	BB	1	1
2	Buckling load-Factor of safety	T1	776-777	BB	1	2
3	Euler's theory	T1	778-779	BB	1	3
4	Different end conditions	T1	779-783	BB	1	4
5	Rankine's-Gordon formula	T1	789-791	BB	1	5
6	Axial and eccentric loads	T1	381-382	BB	1	6
7	Direct, bending and combined bending stress	T1	382-383	BB	1	7
8	Calculation of combined bending stress	T1	384-390	BB	1	8
9	Core section- Middle third and Middle fourth rule.	T1	402-405	BB	1	9
Outcome of Unit I: **CO1:** Familiarize the behaviour of column under axial and eccentric loads.						
UNIT II – DEFLECTION OF DETERMINATE BEAMS						
10	Governing differential equation	T1	314-315	BB	1	10
11	Elastic curve for various types of beams	T1	315-316	BB	1	11
12	Slope and deflection	T1	316	BB/PPT	1	12
13	Macaulay's method	T1	334-357	BB	2	14
14	Moment area method	T1	358-380	BB	2	16
15	Conjugate beam method.	T1	381-403	BB	2	18
Outcome of Unit II: **CO2:** Establish the slope and deflection in beams by using various methods.						
UNIT III – CYLINDERS						
16	Thin cylinder	T2	747-751	BB	1	19

17	Circumferential and longitudinal stress	T2	748-749	BB/PPT	1	20
18	Shear stress	T2	345-350	BB	1	21
19	Volumetric strain	T2	350-355	BB	1	22
20	Thick cylinder	T2	797-798	BB	1	23
21	Lame's equation	T2	799-804	BB	1	24
22	Hoop and radial stress distribution	T2	810-816	BB	2	26
23	Compound cylinders.	T2	797-787	BB	1	27
Outcome of Unit III: **CO3:** Examine the problems related to thin and thick cylinders subjected to fluid pressure.						
UNIT IV – PRINCIPAL STRESS AND THEORIES OF ELASTIC FAILURE						
24	Two dimensional state of stress at a point	R2	1030-1034	BB	1	28
25	Normal and shear stresses	R2	134-136	BB	1	29
26	Analytical method	R2	998-1003	BB	1	30
27	Theories of failure	R2	1015-1016	BB	1	31
28	Maximum principal stress theory	R2	1017-1018	BB	1	32
29	Maximum shear stress theory	R2	1018-1019	BB	1	33
30	Maximum principal strain theory-	R2	1017-1018	BB	1	34
31	Strain energy theory	R2	1026-1027	BB	1	35
32	Simple Problems.	R2	1027-1030	BB	1	36
Outcome of Unit IV: **CO4:** Understand the basic concepts of principle plane and stresses, theory of elasticity.						
UNIT V - ANALYSIS OF PLANE MEMBERS						
33	Elements and types of a truss- Determinacy and stability	R3	217-272	BB	1	37
34	Analysis of statically determinate plane truss	R3	272-274	BB	2	39
35	Method of joints	R3	276-283	BB	2	41
36	Method of sections	R3	284-291	BB	2	43
37	Method of tension coefficient.	R3	292-298	BB	2	45
Outcome of Unit V:						

CO5: Determine the forces in plane truss members.
CO6: Familiar with column and beam analysis

Course Outcome:

At the end of course: Students should be able to do:
CO1:: Familiarize the behaviour of column under axial and eccentric loads.
CO2: Establish the slope and deflection in beams by using various methods
CO3: Examine the problems related to thin and thick cylinders subjected to fluid pressure
CO4: Understand the basic concepts of principle plane and stresses, theory of elasticity.
CO5: Determine the forces in plane truss members.
CO6: Familiar with column and beam analysis.

Course Outcome Vs Program Outcome Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	3	2					2	3	
CO2	3	3	2	2	2	2	1					1	3	
CO3		2	2	2	2	2	2					2	3	
CO4	2	2	1	1	1	1						2	3	
CO5		2	2	2				1				1	2	
CO6	2	2										2		
AVG	**1.6**	**2.3**	**1.6**	**1.6**	**1.3**	**1.3**	**0.8**	**1**	**0**	**0**	**0**	**1.6**	**2.3**	

Content beyond Syllabus:

- Know the theories of failure and relevant two-dimensional stress.

Internal Evaluation Components:

Webportal	Assignment	Components	Topic Number with Topic / Unit Details	Relevance to CO
Webportal 1	--	Assessment – I (60)	Unit I and II	CO 1 & CO2
	1	Assignment – Handwritten (20)	Unit I	CO 1
	2	Assignment – Poster Presentation / PPT (20)	Unit II	CO2
Webportal 2	--	Assessment – II (60)	Unit III and IV	CO3 & CO4
	3	Seminar (20)	Unit III	CO3
	4	Case Study Report (20)	Unit IV	CO4
Webportal 3	--	Model Exam (75)	Unit I to V	CO1 to CO6
	5	MCQ (15)	Unit I to V	CO1 to CO6
	-	Course Attendance (10)	--	--

Submission Details:

Phase 1(Before AT 1)		Phase 2 (Before AT 2)		Phase 3 (Model)
Assignment 1	Assignment 2	Assignment 3	Assignment 4	Assignment 5

Google Class Code Details:

Class Name:

PLAN OF ASSESSMENT TEST –DISTRIBUTION OF MARKS:

TEST	CO- MARK WISE DISTRIBUTION						BLOOM'S LEVEL MARK WISE DISTRIBUTION					
AT-1	CO1	CO2	CO3	CO4	CO5	CO6	BTL1	BTL2	BTL3	BTL4	BTL5	BTL6
	37	23					10	10	16	14		
AT-2	CO1	CO2	CO3	CO4	CO5	CO6	BTL1	BTL2	BTL3	BTL4	BTL5	BTL6
			37	23			10	10	26	14		
MODEL	CO1	CO2	CO3	CO4	CO5	CO6	BTL1	BTL2	BTL3	BTL4	BTL5	BTL6
	20	20	20	20	20		10	10	48	32		