Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2018-2019

Course Handout Part II

01-08-2019

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : **CE F211**
Course Title : *Mechanics of Solids*
Instructor-in-Charge : Chandu Parimi

Scope and Objective of the Course:

Introduction to mechanics of rigid bodies and deformable bodies, Thermal stresses, Equilibrium of forces, Bending moment and shear force diagrams for determinate beams and frames, Analysis of statically determinate trusses; Flexural and shear Stresses in beams, Combined stresses, Stresses and strains on inclined planes, Introduction to torsion, Torsion in shafts, Slope and deflection in beams due to bending, Introduction to Energy Methods, Stresses in thin cylindrical shells, Suspension cables, Failure theories, Buckling of columns using Euler's Theory.

Learning Objectives –

Students who finish this course should be

1. able to calculate and represent pictorially internal forces in statically determinate beams and structures (frames and trusses).
2. able to visualize the concept of stress and strain and calculate the variation based on the plane of action in 2D and their relationships
3. able to calculate stresses caused due to axial, bending and torsional loads and the combinations
4. able to calculate deflections in statically determinate beams and frames

Student Learning Outcomes (SLOs) assessed in this course – **(a), (g) and (e).**

Textbook:

Mechanics of Materials; Russell C Hibbler, 9th Edition, 2014, Pearson Education Inc.

Reference Books*:*

1. **Mechanics of Materials; F. P. Beer, E. R. Johnston and J. T. DeWolf, Third Edition, 2002, McGraw-Hill International Edition.**
2. **Mechanics of Solids, AN INTRODUCTION, T. J. Lardner, R R Archer, International Edition, 1994, McGraw-Hill**
3. **Introduction to Solid Mechanics by I. H. Shames, 2nd Edition, 1980, Prentice Hall of India Private Ltd. New Delhi.**
4. **Hibbler, R. C., Structural Analysis, 9th Edition, 2017 Pearson Education.**

Course Plan:

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book	SLO*
1-2	able to understand type of bodies and possible deformation modes, the conditions of equilibrium	Introduction to mechanics of rigid bodies and deformable bodies, Thermal stresses, Equilibrium of forces	**2 TB**	**(a)**
3-7	able to calculate and represent pictorially internal forces in statically determinate beams	Bending moment and shear force diagrams for determinate beams and frames.	**6 TB**	**(a),(e)**
8-11	able to calculate and represent pictorially internal forces in statically determinate structures	Analysis of statically determinate trusses.	**3, RB-4**	**(a)**
12-14	able to visualize the concept of stress and strain and to calculate the stresses caused due to axial load	Analysis of Axially loaded members.	**4 TB**	**(a)**
15-19	able to calculate the stresses caused due to bending, shear	Determination of Flexural and shear stresses in beams.	**6,7 TB**	**(a)**
20-23	able to calculate the stresses caused due to torsional loads and the combinations	Introduction to torsion, Torsional stresses in shafts, stresses in members under combined loading.	**5,8 TB**	**(a),(e)**
24-27	able to calculate the variation of stress and strain based on the plane of action in 2D and their relationships	Stresses and strains on inclined planes.	**9,10 TB**	**(a),(e)**
28-31	able to calculate deflections in statically determinate beams and frames	Slope and deflection in beams due to bending, Introduction to Energy Methods.	**12, 14 TB**	**(a),(e)**
32-33	able to calculate stresses in shells subjected to uniform pressure	Stresses in thin cylindrical shells.	**8 TB**	**(a)**
33-35	able to calculate and represent pictorially internal forces in statically determinate structures	Analysis of cables and arches.	**5 , RB-4**	**(a),(e)**
36-37	able to differentiate between von-mises and tresca failure theories	Failure theories.	**10 TB**	**(a)**
38-40	able to understand the concept of buckling of a	Buckling of columns using Euler's Theory.	**13 TB**	**(a)**

	column			

***Student Learning Outcomes (SLOs):**

SLOs are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.

(a) an ability to apply knowledge of mathematics, science and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Assignments (Minimum 10)	-	35%	Continuous	OB
Classroom Interaction (Minimum 30)	-	15%	Continuous	OB
Mid-semester Test	90 min	20%	4/10 11 AM to 12:30 PM	CB
Comprehensive Exam	180 min	30%	11/12 AN	OB

Chamber Consultation Hour: Will be announced in class

Notices: Will be posted in Google Classroom

Make-up Policy: Make-up will be granted only to genuine cases with prior permission from the IC. Make ups will not be given to students who contact the IC after the evaluation component.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

INSTRUCTOR-IN-CHARGE