



Kadi Sarva Vishwavidyalaya
Faculty of Engineering & Technology
First Year Bachelor of Engineering (ME / AU / EE / CV)
(With Effect From: Academic Year 2017-18)

Semester - II (Branches: Civil/ME/AU/EE)
MECHANICS OF SOLIDS (CC108-N)

Teaching Scheme				Total Credit	Evaluation Scheme				
Lect Hrs	Tut Hrs	Prac. Hrs	Total	04	UE	IE	CIA	Practical	Total
03	00	02	05		70	30	20	30	150

Out Line of the Course:

Sr. No.	Title of the Unit	Minimum Number of Hours
1	Introduction	2
2	Fundamentals of Statics	8
3	Center of Gravity and Moment of Inertia	10
4	Simple Stress and Strain	12
5	Support Reactions	5
6	Bending and Shear Stress	8
TOTAL		45

Total hours (Theory): 45 Hours

Total hours (Practical): 30 Hours

Total hours: 75 hours

LEARNING OBJECTIVES:

The educational objectives of this course are

- ✓ To understand the fundamentals of structural analysis that is essential for an economical dimensional proportioning of various civil engineering structures.
- ✓ To make students familiar with techniques to find analytical solution to a range of structural engineering problems.
- ✓ To prepare the students to give cost-effective, safe and durable structural solution to the society.



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Unit No	Topics	Lectures (Hours)	Percentage weight
1.	INTRODUCTION Introduction to Mechanics and its branches, Fundamental concepts Idealizations in mechanics , Fundamental Principles of mechanics S.I. system of unit, Scalar and vector quantity , Types of vectors	2	5%
2.	FUNDAMENTAL OF STATICS Force and force system and types of forces, Understanding of resultant, equilibrium, moment and couple , Solution of coplanar concurrent force system using: (a) Law parallelogram ,(b) Law of triangle, (c) Resolution of force system (d) Law of polygon , (e) Lami's theorem Solution of coplanar non concurrent force system using : (a) Resolution of force system , (b) Varignon's theorem	8	15%
3.	CENTER OF GRAVITY AND MOMENT OF INERTIA Introduction, , Basic definitions, Calculation of CG of compound lines, planes, bodies, Concept of suspended bodies, Pappus - guldianus theorems, Basic understanding of moment of inertia and section modulus, Calculation of moment of inertia compound planes	10	25%
4.	SIMPLE STRESS AND STRAIN <i>Simple stress and strain</i> Types of stress and strain, Elastic limit, Hooke's law, Determination of stress in members due to external load, Stress-strain curve for mild steel in tension, Ultimate stress, Working stress, Factor of safety, Deformation of a body due to self weight, Stresses in members with varying cross section, Principle of super position, Extension of a tapered uniformly due to an axial force applied at each end, Stresses in composite members <i>Elastic constants</i> Introduction Longitudinal & lateral strain, Poisson's ratio, volumetric strain volumetric strain of different shape bars subjected to normal stresses on three mutually perpendicular planes.	12	30%



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	<i>Bulk modulus</i> Relation between Bulk modulus and Young's modulus, Shear stress and strain, Principle of complimentary shear stress, Normal stresses due to shear stress, Modulus of rigidity, Relation between Modulus of rigidity and Young's modulus <i>Thermal stress and strain</i> Introduction Thermal stresses and strain for yielding and non yielding supports, Thermal stresses and strain for Tapering and varying section ,Thermal stresses and strain for composite bars		
5.	SUPPORT REACTION Introduction Types of supports, Types of beams, Types of load	5	10%
6.	BENDING STRESS AND SHEAR STRESS Theory of simple bending, Bending stresses and their distribution, Introduction to shear stress Theory of shearing stress, Shear stress distribution in different sections	8	15%
Total		45	100%

INSTRUCTIONAL METHOD AND PEDAGOGY (Continuous Internal Assessment (CIA)

Scheme):

- ✓ At the start of course, the course delivery pattern, prerequisite of the subject will be discussed Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- ✓ Attendance is compulsory in lectures, Practical and Tutorials which carries 05 Marks.
- ✓ At regular intervals assignments are given, in all, a student should submit all assignments of 05 marks each.
- ✓ Classroom participation and involvement in solving the problems in Tutorial rooms carries 05 Marks.
- ✓ Viva Voce will be conducted at the end of the semester of 05 Marks.
- ✓ One internal exam of 30 marks is conducted as a part of mid semester evaluation.
- ✓ Experiments shall be performed in the laboratory related to course contents.

STUDENTS LEARNING OUTCOME:

On successful completion of the course

- ✓ Students will be able to understand the fundamentals of solids and various methods of Analysis.
- ✓ The course gives students an understanding of the importance of Mechanics of Solids



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TEXT AND REFERENCE BOOKS:

- ✓ Mechanics of solids by Sanju Unadkat & Indrajeet Jain (Tech-Max Publication).
- ✓ Mechanics of solids by Prof. C.S. Sanghavi (Mahajan Publication).
- ✓ Mechanics of solids by Dr. A.K. Arora (Books India Publication).
- ✓ Mechanics of solids by Prof. P.J. shah (S. Chand Publication).
- ✓ Mechanics of solids by H.J. Sawant (Technical Publication).
- ✓ Mechanics of solids by Gajjar & Shah (Tata McGraw-Hill's Publication).
- ✓ Mechanics of solids by Dr. R.P. Rethaliya (atul Prakashan).
- ✓ Engineering Mechanics by S. Ramamrutham (Dhanpat Rai Publication).
- ✓ Engineering Mechanics by M. Chakraborti (S.K. Kataria & son's Publication).
- ✓ A Text Book of Engineering Graphics By P.J.Shah, S.Chand & Company Ltd., New Delhi. Strength of Materials by S. Ramamrutham (Dhanpat Rai Publication).

WEBMATERIALS:

- ✓ <http://www.wikipedia.org>
- ✓ [http://nptel.iitm.ac.in/video.php?subjectId=105106116.](http://nptel.iitm.ac.in/video.php?subjectId=105106116)
- ✓ <http://nptel.iitm.ac.in/courses/Webcourse-contents/IITdelhi/Mechanics%20Of%20Solids/index.htm>

LIST OF PRACTICALS:

Sr. No	Name of the Experiments
1	Law of Polygon of Forces
2	Equilibrium of Coplanar, Non-concurrent and Non-Parallel Forces
3	Equilibrium of Coplanar Concurrent Force System : Lami's Theorem
4	Equilibrium of Coplanar Parallel Forces : Simply Supported Beam
5	Izod Impact Test
6	Shear Test on Mild Steel
7	Compressive Test on Timber
8	Tensile in M.S. and C.I. and Compression Test on Metals

LIST OF TUTORIALS:

Minimum 10 examples and 3 theory questions from each unit