

ME102	Engineering Mechanics	L-T-P-C: 3-1-0-8	Prerequisites: Nil
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Instructor: G1: Dr. Murshid Imam

Course Group: G1: CE+CB+CS

Class Timings:

G1 Theory: Mon: 9 AM -10 AM, Fri: 9 AM – 11 AM (R102)

Tutorial: Wed: 8 AM - 9 AM (R102-G1, R102-G2)

Course Objectives: The objective of this first course in mechanics is to enable engineering students to analyze basic mechanics problems and apply vector based approach to solve them.

Expected learning outcomes: Following learning outcomes are expected after going through this course.

- a) Learn and apply general mathematical and computer skills to solve basic mechanics problems.
- b) Apply the vector based approach to solve mechanics problems.

Syllabus:

1. Rigid body statics: Equivalent force system. Equations of equilibrium, Free body diagram, Reaction, Static indeterminacy.
2. Structures: 2D truss, Method of joints, Method of section. Beam, Frame, types of loading and supports, axial force, Bending moment, Shear force and Torque Diagrams for a member:
3. Friction: Dry friction (static and kinetic), wedge friction, disk friction (thrust bearing), belt friction, square threaded screw, journal bearings, Wheel friction, Rolling resistance.
4. Centroid and Moment of Inertia
5. Virtual work and Energy method: Virtual Displacement, principle of virtual work, mechanical efficiency, work of a force/couple (springs etc.), Potential Energy and equilibrium, stability.

6. Introduction to stress and strain: Definition of Stress, Normal and shear Stress. Relation between stress and strain, Cauchy formula.
7. Stress in an axially loaded member,
8. Stresses due to pure bending,
9. Complementary shear stress,

10. Stresses due to torsion in axi-symmetric sections:

11. Two dimension state of stress, Mohr's circle representation, Principal stresses and strains.

Text books:

1. F. P. Beer and E. R. Johnston, Statics and Dynamics/Vector Mechanics for Engineers: Vol I - Statics, Vol II – Dynamics, Tata McGraw Hill. – **150 Copies in the Library**
2. F. P. Beer and E. R. Johnston, J.T. Dewolf, and D.F. Mazurek, Mechanics of Materials, McGraw Hill Education (India) Pvt. Ltd..– **80 Copies in the Library**

References:

1. H. Shames, Engineering Mechanics: Statics and dynamics, 4th Ed, PHI, 2002. – **25 Copies in the Library**
2. E.P. Popov, Engineering Mechanics of Solids, 2nd Ed, PHI, 1998. – **25 Copies in the Library**
3. J. L. Meriam and L. G. Kraige, Engineering Mechanics, Vol I - Statics, 5th Ed, John Wiley, 2002. – **25 Copies in the Library**

Grading Scheme:

Mid-Semester Examination: 25%

End-Semester Examination: 35%

Class test: 24%

Attendance: 8%

Tutorials*: 8%

** Tutorial problems are required to be solved in class on A4 size paper, stapled together and submitted at the end for evaluation. Instructors and TA's will be available to help clarify any fundamental doubts. You are allowed to bring the course textbook during the tutorial sessions. However, no discussion among the students is allowed.*

Schedule:

Total Number of advanced announced class test: 2 (one before Mid Sem and one after Mid Sem)

Total Number of Surprise Class test: 4 (two before Mid Sem and two after Mid Sem)

PLAGIARISM DECLARATION:

1. I know that plagiarism means copying and submitting assignments, class tests, tutorials, and examination papers of another as if they were one's own. I know that plagiarism covers this sort of use of material found in textual sources and from the Internet.
2. I acknowledge and understand that plagiarism is wrong and is unfair to the hardworking fellow students who have spent their time and effort for these submissions.
3. I pledge/declare that I will not use any such unfair means for this course ME102. Failing to abide by these, I may suitably be penalized and debarred from appearing in the examinations.

ATTENDANCE DECLARATION:

1. I understand that attending lectures regularly is an integral part of the IIT System.
2. I acknowledge and understand that a minimum of 75% attendance is compulsory for the course. The 25% leave margin includes any leave, informed/uninformed, as well as emergency situations. It is my responsibility to plan accordingly and always keep a cushion for unforeseen situations.
3. I understand that no exceptions to 75% attendance rule will be made in this course.
4. I understand that I have to be on time for the class and I will be marked absent in case I am late by more than five minutes, that too once or twice in the whole semester.

5. I understand that no compensatory examinations/class tests/tutorials will be conducted in case I miss any of them.
6. I acknowledge that I have been familiarized with the attendance policy at the start of the semester and I will be debarred from appearing in the examination and failed in the course in case of non-compliance.