



Code	Subject Title	Cr. Hrs	Semester
MATH-102	Mathematics B-I [Vectors & Mechanics (I)]	4	I
Year	Discipline		
1	Mathematics-I,II		

Vector Algebra

- Introduction to vector algebra
- Scalar and vector product
- Scalar triple product and vector triple product
- Applications to geometry

Vector Calculus

- Limit, continuity and differentiability of vector point functions
- Partial derivatives of vector point functions
- Scalar and vector fields
- The gradient, divergence and curl
- Expansion formulas.

Forces

- Fundamental concepts and principles
- Inertial-non-inertial frames, Newton's laws
- Resultant of several concurrent forces
- The parallelogram law of forces
- Resolution of a forces, triangle of forces
- Lamy's theorem, polygon of forces
- Conditions of equilibrium for a particle
- External and internal forces, principle of transmissibility
- Resultant of like and unlike parallel forces
- Moment of forces about a point, Varignon's theorem
- Moment of a couple, equivalent couples, composition of couples
- Reduction of coplanar forces to a force or a couple

Friction

- Dry friction and fluid friction
- Laws of dry friction, coefficients of friction, angle of friction
- Equilibrium of a particle on a rough inclined plane
- Particle on a rough inclined plane acted on by an external force
- Conditions for sliding or titling

Virtual Work

- Principle of virtual work
- Problems involving tensions and thrust

Recommended Books

1. Fowles, G.R, Cassiday, G.L. *Analytical Mechanics*, 7th Edition, Thomson Brook Cole, 2005
2. Jafferson, B. Beadsdsworth, T. *Further Mechanics*, Oxford University Press, 2001
3. Joseph F, Shelley. *Vector Mechanics*, Mc-Graw Hill Company, 1990



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4. Murray R. Spiegel, *Theoretical Mechanics*, Schaum's Outline Series, Mc Graw Hill Book Company
 5. Hwei P. HSU, *Applied Vector Analysis*, San Diego, New York, 1984.
 6. Murray R. Spiegel, *Vector Analysis*, Schaum's Outline Series, McGraw Hill Book Company, 1959
 7. D.K. Anand and P.F. Cunniff, *Statics and Dynamics*, Allyn and Becon, Inc. 1984
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