

# **(BM-113) - Engineering Mechanics**

## **Course Outline:**

### **Theory:**

#### **1. Introduction:**

1. General principles;
2. units of measurement;
3. Force Vectors:
4. Addition of vectors;
5. Cartesian vectors;
6. Free vector;
7. Position vectors;
8. Force directed along a line.

#### **2. Equilibrium of a Particle:**

1. Conditions for the equilibrium;
2. Free body diagram; 3D force systems;
3. Force system resultants;
4. Moment of force;
5. Virognon's theorem; cross product;
6. Moment of a couple;
7. Equivalent systems.

#### **3. Equilibrium of a Rigid Body:**

1. Equilibrium in 2D and 3D;
2. Constrains for a rigid body;
3. Redundant and improper constraints.

#### **4. Friction:**

1. Types of friction;
2. Angle of repose;
3. Application of friction.

#### **5. Kinematics of a Particle:**

1. Rectilinear motion;
2. Curvilinear motion;
3. Motion of projectile;
4. Absolute dependent motion of two particles.

#### **6. Kinetics of a Particle:**

1. Equation of motion for a system of particle;
2. Equation of motion in rectangular, cylindrical, normal and tangential coordinates;
3. Principles of work and energy for a system of particles;
4. Linear momentum;
5. Conservation of momentum;
6. Impact;
7. Angular momentum;
8. Kinematics of a rigid body;
9. Translation;
10. Rotation.

## **Suggested Teaching Methodology:**

- Lecturing
- Written Assignments Report Writing

## **Suggested Assessment:**

### **Theory (100%)**

- Sessional (20%)
- Quiz (12%)
- Assignment (8%)
- Midterm (30%)
- Final Term (50%)

### **Laboratory (100%)**

### **Text and Reference books:**

Engineering Mechanics Statics; R. C. Hibbeler, 12th ed. 2007, Pearson Prentice Hall. Engineering Mechanics Dynamics; R. C. Hibbeler, 12th ed. 2007, Pearson Prentice Hall.

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