	Information of every subject	
1	Unit name:	Engineering Mechanic
2	Code:	ME-21015
3	Classification:	Engineering subject
4	Credit value:	2.5
5	Semester/ Year Offered:	2/2
6	Pre-requisite:	Branch of physical science
7	Mode of delivery:	Lecture, Practical
8	Practical	10%
	Tutorials	20%
	Mid-term/ final Examination	70%
9	Academic staff teaching unit:	
10	Course outcome of unit: **Semester I** In this course, students will be able (a) To apply the basic principles of Mechanics, scalar and vectors. (b) To calculate the resultant forces of a rigid body. (c) To construct the free body diagram of a particle for equilibrium position. (d) To calculate the moments of a force, the forces in the member of a truss **Semester II** In this course, students will be able (e) To apply basic kinematics concepts -displacement, velocity and acceleration. (f) To apply basic dynamics concepts- force, momentum, work and energy. (g) To apply Newton's laws of motion. (h) To apply other basic dynamics concept- the work energy principle, Impulse-Momentum principle and the coefficient of restitution.	
11	Synopsis of unit: To give a statement of Newton's Laws of Motion and Gravitation. This subject is concerned with statics.To show how to add forces and resolve them into components using the Parallelogram Law ,Triangle Construction and Pythagorean theorem. To discuss the concept of the moment of a force and how to calculate it in two and three dimension. This subject is also concerned with dynamics, which deal with the accelerated motion of a body. This subject of dynamics will be presented in two parts: kinematics, which treats only the geometric aspects of the motion, and kinetics, which is the analysis of the	

	forces causing the motion. To develop these principles, the dynamics of a particle will be discussed first, followed by topics in rigid-body dynamics in two and then three dimensions.
12	**Topic:** **Semester (I)** **Chapter 1 General Principles** 1.1 Mechanics 1.2 Fundamental Concepts 1.3 Units of Measurement 1.4 The International System of Units **Chapter 2 Force Vectors** 2.1 Scalars and Vectors 2.2 Vector Operations 2.3 Vector Addition of Forces 2.4 Addition of a System of Coplanar Forces 2.5 Cartesian Vectors 2.6 Addition and Subtraction of Cartesian Vectors 2.7 Position Vectors 2.8 Force Vector Directed along a Line 2.9 Dot Product **Chapter 3 Equilibrium of a Particle** 3.1 Condition for the Equilibrium of a Particle 3.2 The Free-Body Diagram 3.3 Coplanar Force Systems **Chapter 4 Force System Resultants** 4.1 Moment of a Force- Scalar Formulation 4.2 Cross Product 4.3 Moment of a Force- Vector Formulation 4.4 Principle of Moments 4.5 Moment of a Force about a Specified Axis 4.6 Moment of a Couple 4.7 Equivalent System 4.8 Resultants of a Force and Couple System 4.9 Further Reduction of a Force and Couple System **Chapter 5 Equilibrium of a Rigid Body** 5.1 Condition for Rigid-Body Equilibrium Equilibrium in Two Dimensions 5.2 Free-Body Diagrams 5.3 Equations of Equilibrium 5.4 Two- and Three-Force Members Equilibrium in Three Dimensions 5.6 Equations of Equilibrium **Chapter 6 Structural Analysis** 6.1 Simple Trusses 6.2 The Method of Joints 6.3 Zero-Force Members 6.4 The Method of Sections

Chapter 8 Friction

8.1 Characteristics of Dry friction
8.2 Problems Involving Dry friction

Chapter 9 9.2 Center of Gravity, Center of Mass, and Centroid for a Body
9.3 Composite Bodies

Semester (II)

Chapter12 Kinematics of a Particle

12.1 Introduction
12.2 Rectilinear Kinematics: Continuous Motion
12.3 Rectilinear Kinematics: Erratic Motion
12.4 General Curvilinear Motion
12.5 Curvilinear Motion: Rectangular Components
12.6 Motion of a Projectile
12.7 Curvilinear Motion: Normal and Tangential Components
12.8 Curvilinear Motion: Cylindrical Component
12.9 Absolute Dependent Motion Analysis of Two Particles
12.10 Relative-Motion Analysis of Two Particles Using Translating Axes

Chapter13 Kinetics of a Particle: Force and Acceleration

13.1 Newton's Laws of Motion
13.2 The Equation of Motion
13.3 Equation of Motion for a System of Particles
13.4 Equations of Motion: Rectangular Coordinates
13.5 Equations of Motion: Normal and Tangential Coordinates
13.6 Equations of Motion: Cylindrical Coordinates

Chapter14 Kinetics of a Particle: Work and Energy

14.1 The Work of a Force
14.2 Principle of Work and Energy
14.3 Principle of Work and Energy for a System of Particles
14.4 Power and Efficiency
14.5 Conservative Forces and Potential Energy
14.6 Conservation of Energy

Chapter15 Kinetics of a Particle: Impulse and Momentum

15.1 Principle of Linear Impulse and Momentum
15.2 Principle of Linear Impulse and Momentum for a System of Particles
15.3 Conservation of Linear Momentum for System of Particles
15.4 Impact
15.5 Angular Momentum
15.6 Relation Between Moment of a Force a Angular Momentum
15.7 Angular Impulse and Momentum Principles

Chapter 16 Planar Kinematics of a Rigid Body

16.1 Rigid-Body Motion
16.2 Translation

	16.3 Rotation about a Fixed Axis 16.4 Absolute Motion Analysis 16.5 Relative-Motion Analysis: Velocity 16.6 Instantaneous Center of Zero Velocity 16.7 Relative-Motion Analysis: Acceleration 16.8 Relative-Motion Analysis using Rotating Axes **Chapter 17 Planar Kinetics of a Rigid Body: Force and Acceleration** 17.1 Moment of Inertia 17.2 Planar Kinetic Equations of Motion 17.3 Equations of Motion: Translation
14	Main references: Engineering Mechanic Statics and Dynamics (11thEdition)R.C.HIBBELER
15	Additional references: Engineering Mechanic Statics and Dynamics (7thEdition and 13thEdition)