2005 - APPLIED MECHANICS - I												
Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)							
					Theory		Practical Ex.		Total			
Lectures	Practical	Credits										
3	2	5	25	25	3Hrs.	100	-		150			
Pre-requisite		Source										
Nil		CVL										

Semester	Theory	Test	Total	TW	PR	Gr Total
	75	25	100	25	—	125

RATIONALE: - For any Engineer, Applied Mechanics is vital to understand the fundamental principles and concepts, which form the underlying basis for engineering design. Its applications in Engineering are infinite viz.-bridges, dams, ships, rockets, missile, artificial satellites, robotics etc, all owing their existence to Mechanics. Even in daily life Mechanics is self-evident. Since the technician will be required to deal with many basic Engineering structures in the course of his employment in the industry this course in Applied Mechanics adequately lays emphasis on the required vital topics.

COURSE CONTENTS	Hrs	Mks
1. FUNDAMENTAL CONCEPTS Classification of mechanics: - Static, dynamic (Kinematics & Kinetics). S.I. system of units: - Basic units LMT, inter-conversion between units, inter-conversion between prefixes of units. Concept of rigid body and de-formable body. Vectors and Scalar: - Definition, difference between vector quantity and scalar quantity, representation of vector quantity in magnitude & direction (meaning of sense of a vector), types of vectors with examples: - Free, sliding and fixed. Addition of vectors: - Law of Parallelogram, law of triangles, Polygon law, subtraction of vectors.	2	4
2. FORCE Definition and units. Specifications of force as a vector: - Magnitude, direction and point of application. Concept of mass and weight, units. Types of force with examples- Direct, remote action e.g. Gravity force, magnetic force, electric force. Effect of forces on a body- External, internal. Classification of forces- Concentrated, distributed over an area, distributed over a volume, uniformly distributed load, uniformly varying load, equivalent-force. Principle of transmissibility, system of forces: -Collinear and non-collinear, concurrent and non-concurrent, coplanar and non-coplanar, parallel and non-parallel.	4	8
3. MOMENTS AND COUPLES Definition and unit of a moment. Sign conventions – Clockwise and anti-clockwise. Moment as a vector: - Magnitude, direction (Right hand thumb rule). Definition and units of a couple. Characteristics of a couple.	2	4
4. RESOLUTION AND COMPOSITION OF FORCES Resolution of a force. (Hint – Reverse of law of Parallelogram of forces and Polygon of forces) Rectangular components: -Resolution of a force into two rectangular components, independence of each rectangular component. Resolution of a force into force and couple.	7	16

Resultant of a force - Definition, Parallelogram law, Triangle law, Resultant of two mutually perpendicular forces, Polygon law, resultant of non-concurrent coplanar force system by Varignon's theorem, resultant of parallel forces.

5. EQUILIBRIUM 8 24

Statement of Newton's third law. Concept of free body diagram- Reactions of various supports: -Flexible-cable, smooth, rocker, roller supports, pinned, hinged supports, link supports and fixed support, drawing of F.B.D.

Concept of equilibrium. Definition of equilibrium and its comparison with resultant. Conditions of equilibrium for co-planar force system. Lami's theorem.

Reaction of beams subjected to u d l and concentrated loads only.(simply supported, hinged and roller support overhangs)

6. FRICTION 7 16

Definition. Advantages and disadvantages. Types of friction –Static, dynamic - Sliding, rolling. Coulomb's law of static-friction: -Coefficient of friction, angle of friction (cone of friction), angle of repose.

Equilibrium of bodies involving friction: -Blocks on horizontal & inclined plane, ladder friction, wedge friction, rope friction (coil friction – no derivation), screw friction (no derivation).

7. KINEMATICS (RECTILINEAR MOTION) 7 20

Kinematic variables –Definition & units - Displacement and distance, velocity and speed, uniform and average velocity, uniform acceleration and retardation.

Problems based on kinematic equations for uniform acceleration: -

$V = u + at$. ; $S = ut + \frac{1}{2} at^2$; $V^2 = u^2 + 2as$;

Velocity – time diagrams. Motion under gravity.

8. CENTRE OF GRAVITY 5 8

Centroid of simple regular areas. (No derivation), Centroid of built – up (composite) areas; C.G. of simple regular filled solids. (No derivation); C.G. of built-up (composite) filled solids.

Total	42	100

PRACTICALS

1. Verification of Parallelogram law of forces.
2. Verification of Triangle law of forces.
3. Verification of Polygon law of forces
4. To prove Lami's theorem.
5. Co-efficient of friction for any three surfaces and angle of repose
6. To prove Lami's theorem.
7. Determination of reactions in a beam.

GRAPHICAL ANALYSIS

1. Determination of resultant of coplanar concurrent forces.
2. Determination of resultant of coplanar non-concurrent forces and parallel forces.
3. Determination of centroid of built – up lamina.

REFERENCE BOOKS

1. Fundamentals of applied Mechanics by Dadhe, Jamdar, walavaikar
2. Applied Mechanis by R. S. Khurmi.
3. Mechanics (S.I. Version) by J.D. Johnwilley
4. Applied Engineering Mechanics by Jensen A. McCraw Hill.
5. Applied Mechanics S.I. Edition, Walkar J. D. English UNI Press.
6. Applied Mechanics by S. Ramamrutham.
7. Applied Mechanics Vol. I R. C. Patel and B. M. Patel.
8. Applied Mechanics by K.L. Kurma.
9. Engg. Mechanics by A. R. Basu.
10. Statics by Mokashi.