2006 - APPLIED MECHANICS - II

Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)					
Lectures	Practical	Credits			Theory		Practical Ex.		Total	
3	2	5	25	25	3Hrs.	100		-	150	

Pre-requisite	Source		Theory	Test	Total	TW	PR	Gr Total
2005	CVL	Semester	75	25	100	25	—	125

RATIONALE: -The second course in Applied Mechanics is designed to develop an adequate knowledge of the principles of dynamics as a basis to the analysis of moving structures and to the analysis of all types of machinery. A chapter of Analysis of Structures (static) is also been included in this course.

COURSE CONTENTS	Hrs	Mks

1. ANALYSIS OF TRUSSES — 6, 20

Meaning of a truss and uses. Assumptions made in analysis of trusses.
Internal stability of trusses: - Definition of perfect and imperfect trusses, forces in
   members of pin-jointed truss – tension and compression.
Analysis of forces in members of a truss: - Method of joints, method of sections.

2. CURVILINEAR MOTION OF PARTICLE — 5, 8

Definition: Projectile, trajectory, angle of projection, range, time of flight.
   Assumptions made. Equations for - Motion in X and Y direction, time of flight,
   maximum height, horizontal range.

3. KINEMATICS OF CIRCULAR MOTION — 4, 8

Definition and units: - Angular displacement (θ), Angular speed (η) and velocity (ω),
   Angular acceleration (α). Relationships between Linear and angular displacement,
   linear and angular velocity, linear and angular acceleration (both tangential &
   normal). Equations of motion: - $\omega = \omega_0 + \alpha t$, $\theta = \omega_0 t + 1/2 \alpha t^2$, $\omega^2 = \omega_0^2 + 2 \alpha \theta$

4. KINETICS — 7, 16

Newton's laws of motion – I and II; Definition and units: - Momentum, concept of
   force with respect to momentum; Relationship between force, mass and
   acceleration; D' Alembert's Principle.

5. MOMENTUM IMPUSE IMPACT. — 5, 8

Impulse as a vector – Definition & units; Impact, Impulsive force.
Law of conservation of momentum, $m_1 u_1 + m_2 u_2 = m_1 v_1 + m_2 v_2$.

6. WORK, POWER, ENERGY — 8, 16

Work – Definition and units, graphical representations of work done.
Energy - Definition & units, types of mechanical energies, equation of K.E. & P.E.
Law of conservation of energy & work energy principle, total energy.
Power - Definition & units, power as (force x velocity), rated power of pumps.

7. KINETICS OF CIRCULAR MOTION — 5, 8

Work done by a torque. Definition & units: -Centripetal acceleration, centripetal force, and
   centrifugal force. Banking of curves: -Super-elevation, reaction on two wheels on horizontal
   track, maximum velocity to avoid skidding, maximum velocity to avoid overturning.

8. SIMPLE LIFTING MACHINES · — 8, 16

Definition - Simple machine, mechanical advantage, velocity ratio and efficiency. Law of Machine.
   Friction in a machine: -Effort lost in machine, load lost in machine. Working and construction,
   law equations (no derivation) of -Inclined plane, simple screw jack, system of pulleys, single &
   double purchase crabs, simple & differential axle and wheel, worm and worm wheel.

Total — 48, 100

PRACTICALS

Minimum six experiments on different simple m/c to find M.A., V.R. and efficiency and to prove law of machine. GRAPHICAL ANALYSIS Maxwell's diagram for analysis of trusses, cantilever truss – 1 problem, Simply supported truss – 2 problems.

REFERENCE BOOKS

1. Fundamentals of Applied Mechanics by Dadhe, Jamdar, Walavaikar.
2. Applied Mechanics 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. II, R.C. Patel and B.M. Patel .
8. Applied Mechanics by K.L. Kurma.
9. Engg. Mechanics by A. R. Basu.
10 Dynamic by Mokashi