MMA-E315
MECHANICS

MM : 100 Sessional : 30
Time : 3 hrs ESE : 70
L T P Pass Marks : 40
5 2 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain 10 short answer type questions of six marks each and student shall be required to attempt any five questions. Sec.-B shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper

Equilibrium of forces in 3D: Condition of equilibrium for a system of forces in 3D, finite and infinitesimal displacements of a rigid body, work, potential energy virtual work, D'Alembert' s principle.

Motion of rigid body: General motion of a rigid body, momental ellipsoid and principal axes, kinetic energy and angular momentum of a rigid body, principles of energy and momentum, moving frames of reference, Coriolis force.

Lagrange's and Hamilton theory: Generalized forces, Lagrange's equation of motion, Lagrangian function, generalized momentum, deduction of principle of energy from Lagrange's equations (conservative field), Lagrange's equations with impulsive forces, Hamilton formulation, Hamilton to Lagrangian, Ignoration of coordinate and Routh's product procedure, Hamilton principle, Lagrange's equations by variational methods, derivative of Lagrange's equation from Hamilton principle.

Small oscillations: The general theory of small oscillation, stable equilibrium and small oscillation, the approximate forms of T and V, normal modes, orthogonality of normal modes.

Text /Reference Books

1. Synge, J.L. and Griffith, B.A., "Principles of Mechanics", McGraw-Hill , 1970
2. Gregory, R.D., "Classical Mechanics", First South Asian Edition, Cambridge Univ. Press, 2008
3. Rana, N.C and Joag, P.S,"Classical Mechanics", Tata McGrawHill, 1991
4. Ramsey, A.S., "Dynamics Part II", Cambridge Univ. Press, 1961
5. Louis, N. Hand and Janet, D. Finch, Analytical Mechanics, Cambridge University Press. 1998