SXAS-110

ANDHRA UNIVERSITY: COLLEGE OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF APPLIED MATHEMATICS

REVISED SYLLABUS
M.Sc. FIRST SEMESTER APPLIED MATHEMATICS
AM 103: CLASSICAL MECHANICS
(With effect from 2007-2008 Admitted Batch)

Duration: 3 hours Maximum Marks: 85
(A total of seven questions are to be set and the student has to answer 5 (five) questions. All questions carry equal marks. The first question which is compulsory carries 17 marks. It consists of 4 short answer sub questions covering the entire syllabus. The remaining six questions each carrying 17 marks are to be set as suggested in the body of the syllabi.)

Lagrangian Formulation: Mechanics of a particle, mechanics of a system of particles, constraints, generalized cordinates generalized velocity, generalized force and potential. D'Alembert's principle and Lagranges equations, some applications of Lagrangian formulation, Hamilton's principle, derivation of Lagrange's equations from Hamilton's principle, extension of Hamilton's principle to non-holonomic systems, Advantages of variational principle formulation, conservation theorems and symmetry properties (scope and treatment as in Art.1.1 to 1.4 and Art 1.6 to 2.6 of Text book.1).

(Two questions are to be set)

Hamiltonian formulation: Legendre transformations and the Hamilton equations of motion, cyclic coordinates and conservation theorems, derivation of Hamilton's equations from a variational principle, the principle of least action, the equation of canonical transformation, examples of canonical transformation, Poisson and Lagrange brackets and their invariance under canonical transformation. Jacobi's identity; Poisson's Theorem. Equations of motion infinitesimal canonical transformation in the poisson bracket formulation. Hamilton Jacobi Equations for Hamilton's principal function, The harmonic oscillator problem as an example of the Hamilton – Jacobi method. (Art. 8.1, 8.2, 8.5, 8.6, 9.1, 9.2, 9.4, 9.5, 10.1, 10.2 of Text book.1)

(Three questions are to be set)

New concept of space and Time, postulates of special theory of relativity, Lorentz transformation equations, Lorentz contraction, Time dilation, simultaneity, Relativistic formulae for composition of velocities and accelerations, proper time, Lorentz transformations form a group (Scope and treatment is as in chapter 1 and 2 of Text book.2).

(One question is to be set)

Text books:

1. Classical mechanics by H.Goldstein, 2nd edition, Narosa Publishing House.
2. Relevant topics from Special relativity by W.Rindler, Oliver & Boyd, 1960.