

B.Sc. Semester - V

March - 2015

Physics Paper : 501

Subject Code : 4294

[Classical Mechanics, Mathematical Physics]

Time: 2:30 Hours

Total Marks: 70

Q - 1 (A)	Derive mathematical statement of D'ALEMBERT's principle.	06
(B)	Explain symmetry and laws of conservation.	08
OR		
Q - 1 (A)	Explain velocity dependent potential. Derive Lagrangian equation for a moving charge in an electromagnetic field.	09
(B)	Explain generalized coordinate and transformation equation.	05
Q - 2 (A)	Derive Lagrangian equation when frictional forces are present.	06
(B)	Explain different types of constraints with illustrations.	08
OR		
Q - 2 (A)	State and prove Hamilton's principle.	08
(B)	Define number of degrees of freedom, Cyclic coordinate. Prove that corresponding momentum is constant.	06
Q - 3 (A)	Discuss the problem of geodesic for a spherical surface.	09
(B)	Show that shortest distance between any two points in a plane is a straight line.	05
OR		
Q - 3 (A)	Obtain Lagrangian equation from Euler's equation.	10
(B)	Discuss series L-C-R problem.	04
Q - 4 (A)	Discuss shortest time period problem.	09
(B)	Define harmonic oscillator. Derive equation of motion for one dimension harmonic oscillator.	05
OR		
Q - 4 (A)	Derive Hamilton's equation of motion.	09
(B)	Obtain Helmholtz equation and time dependent equation for case of diffusion equation using separation of variables method.	05
Q - 5 (A)	Derive Laplacian operator in spherical polar coordinate system.	05
(B)	Derive Laplacian equation in Cartesian coordinate system.	09
OR		
Q - 5 (A)	Derive Helmholtz equation in spherical polar coordinate system.	12
(B)	Obtain Helmholtz equation for Schrodinger equation.	02