

29 MAR 2019

B.Sc. Sem – V
NEW CBCS
Physics Paper - 501
Paper Code – 21478

(Classical Mechanics, Mathematical Physics & Thermal Properties of Solids)

Time: 2 hours 30 min

Total Marks: 70

- Q-1(A) Derive Lagrangian equation for conservative system. 11
(B) Explain generalized coordinates. 03
- OR**
- Q-1(A) Discuss symmetries and laws of conservation. 09
(B) Explain Rayleigh's dissipation function. Prove that the rate of dissipation of 05
energy by friction is equal to twice Rayleigh's dissipation function.
- Q-2(A) State and prove Hamilton's principle. 08
(B) Obtain Lagrangian function and Rayleigh's dissipation function for non 06
mechanical system.
- OR**
- Q-2(A) Derive necessary condition for which the integral J has the extrimum value. 09
(B) Derive Hamilton principle from Newton's equation. 05
- Q-3(A) Define geodesic. Derive equation of great circle. 08
(B) Discuss the problem of simple pendulum. 06
- OR**
- Q-3(A) Derive equation of motion of a particle using polar coordinates. 05
(B) Discuss the problem of Atwood's machine. 05
(C) Prove that for a plane surface geodesis is a straight line. 04
- Q-4(A) Derive Helmholtz equation for spherical polar coordinate system. 11
(B) Derive position dependent equation for heat conduction problem. 03
- OR**
- Q-4(A) Derive Helmholtz equation and time dependent equation for Schrodinger equation. 07
(B) Derive Laplacian equation for Cartesian coordinate system. 07
- Q-5 Explain Debye's theory of specific heat for solid. 14
- OR**
- Q-5(A) Discuss assumption of classical theory of specific heat for solid. 07
(B) What is Dulong- Petit law ? Prove it using classical theory. 07