

**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**



**B.Sc. DEGREE EXAMINATION – PHYSICS**  
**SECOND SEMESTER – APRIL 2022**  
**UPH 2501 – MECHANICS**

Date: 16-06-2022

Dept. No.

Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

**PART – A**

**(10x 2 = 20 Marks)**

**Q. No**

**Answer ALL questions**

- 1 State Newton's first law of motion
- 2 What are conservative and non-conservative forces?
- 3 What are the salient properties of simple harmonic motion?
- 4 Write a short note on time dilation.
- 5 What is central force?
- 6 Prove that Kepler's second law is a consequence of conservation of angular momentum.
- 7 Define "center of mass".
- 8 What is small angle approximation?
- 9 A hollow sphere and solid sphere having the same mass are rolling on the inclined plane without slipping. Which one will reach the ground first? Why?
- 10 Write the postulates of special theory of relativity.

**PART – B**

**(4 x7.5 = 30 Marks)**

Answer any **FOUR** questions

- 11 (a) Show that the trajectory of the projectile motion is parabola  
(b) For what angle of projection, the range is maximum? Show the calculation.
- 12 State and prove (a) perpendicular axis theorem for a plane lamina (b) parallel axis theorem
- 13 (a) Calculate the escape velocity of the particle from the surface of earth.  
(b) Derive the potential energy expression for two masses separated by finite distance.
- 14 Derive Lorentz transformation equations.
- 15 Derive the expression for time period of compound pendulum.
- 16 Explain in detail length contraction and time dilation.

