

The Open University of Sri Lanka  
B.Sc./B.Ed. Degree Programme – Level 05  
No Book Test (NBT) – 2023/2024  
Applied Mathematics  
ADU5303- Newtonian Mechanics II  
Duration :- One Hour



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Date :- 03-02-2024

Time :- 4.00 p.m. – 5.00 p.m.

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**Answer All Questions.**

1. Assume that the equation of motion of a particle relative to the rotating earth is

$$\text{given by } \frac{\partial^2 \underline{r}}{\partial t^2} + 2\underline{\omega} \times \frac{\partial \underline{r}}{\partial t} = -g\underline{k}.$$

An object is projected vertically upward from a point on the surface of the earth with latitude  $\lambda$  with speed  $v_0$ . Find the position of the particle at time  $t$ .

2. If a rectangular parallelepiped with its edges  $2a, 2a, 2b$  rotates about its center of gravity under no forces. Prove that, its angular velocity about one principal axis is constant and about the other axis it is periodic.