

- c) Give example each of conservative and non-conservative forces. (02)
- Q-5 Attempt all questions (14)**
- a) Derive an expression for the gravitational potential energy for a point outside the sphere with proper diagram. (09)
- b) Derive an expression for rotational kinetic energy of a rigid body. (05)
- Q-6 Attempt all questions (14)**
- a) State and prove Norton's theorem. (09)
- b) State Kepler's laws of motion. How can one understand planetary motion based on Kepler's laws. (05)
- Q-7 Attempt all questions (14)**
- a) Explain the concept of time dilation using suitable example. (08)
- b) Differentiate between musical sound and noise. (04)
- c) State Newton's law of cooling. (02)
- Q-8 Attempt all questions (14)**
- a) Define self-induction. Derive the formula for self-inductance $L = -\varepsilon/(\partial I/\partial t)$. Also, prove that in the presence of magnetic field the energy stored in an inductor is $W = (1/2)LI^2$. (08)
- b) Derive the expression for total energy of a simple harmonic motion. (06)

