

Third Semester FYUGP Degree (Reg) Examination**NOVEMBER 2025****KU3DSCPHY202 - MECHANICS**

2024 Admission onwards

Time : 1.5 hours

Maximum Marks : 50

Section A**Answer any 6 questions. Each carry 2 marks.**

1. Write the expression for rate of change of a rotating vector.
2. What do you mean by non inertial coordinate system? Give any two examples
3. A particle executes simple harmonic motion given by $x = \cos(200t + \pi)$. Find the frequency of oscillation.
4. Explain the effect of damping on the time period of an oscillator.
5. Show that torque on a body in central force motion is zero.
6. Write the expression for eccentricity for planetary motion
7. Define proper length and proper time.
8. Write the expressions for classical momentum and relativistic momentum

Section B**Answer any 4 questions. Each carry 6 marks.**

9. What is meant by the centrifugal potential in central force motion? How does it affect the trajectory of a particle?
10. Prove that angular momentum is conserved in central force motion. Discuss the physical implications of this conservation.
11. Two non interacting particles m_1 and m_2 move toward each other with velocities v_1 and v_2 . Their paths are separated by distance b . Obtain an expression for effective potential and draw its energy diagram.
12. (a) Explain the law of addition of velocities (b) Two electrons each of velocity $0.8c$, moves towards each other. Find the relative velocity of one electron with respect to the other.
13. Deduce Einsteins mass energy relation starting from work energy theorem

14. Show that the relativistic expression for the kinetic energy of a particle with mass m and velocity v reduces to

$$\frac{1}{2}mv^2$$

when $v \ll c$. Write the expression for the relativistic total energy of the particle.

Section C

Answer any 1 questions. Each carry 14 marks.

15. (a)What do you mean by coriolis force ? (b) A mass m dropped from a tower lands to the east of a plumb line from the release point. Calculate the deflection of falling mass m dropped from a tower of height h at at the equator
16. (a)Distinguish between transverse and longitudinal waves with examples. Write down the general expression for a plane progressive wave travelling in positive x direction and negative x direction
(b) Derive an expression for energy density of a plane progressive wave.