First Semester FYUGP Physics Examination
November 2024 (2024 Admission onwards)
KU1DSCPHY112 (BASIC MECHANICS)
(EXAM DATE : 06-12-2024)

Time : 90 min   Maximum Marks : 50

Part A (Answer any 6 questions. Each carries 2 marks)

1. Define inertia and its types.   2

2. State the law of conservation of mechanical energy.   2

3. What is angular acceleration, and how is it related to angular velocity?   2

4. What is the physical significance of the moment of inertia?   2

5. What is the difference between torque and force?   2

6. How does the gravitational force between two objects change if the distance between them doubles?
                                                                          2

7. How do satellites remain in stable orbits?   2

8. Explain Kepler's Third Law and how it relates the period and radius of a planet's orbit.
                                                                          2

Part B (Answer any 4 questions. Each carries 6 marks)

9. Give an example where Newton's First Law is applied. How does the law of inertia explain the motion of objects in a car during sudden braking?   6

10. An object of mass 1 kg falls freely from a height of 20 m. Calculate the speed of the object just before it hits the ground, assuming no air resistance.   6

11. Examine the practical applications of angular momentum conservation in human life
                                                                          6

12. Analyze the effects of an external torque on a spinning object. Discuss how this torque affects the angular momentum and the rotational motion of the object. 6

13. Calculate the gravitational force between two masses of 5 kg and 10 kg separated by a distance of 2 m.
                                                                          6

14. Evaluate the significance of the geostationary orbit for communication satellites. What are the advantages and disadvantages?
                                                                          6

Part C (Answer any 1 question(s). Each carries 14 marks)

15. A spring with spring constant k is compressed by a distance x. Calculate the potential energy stored in the spring and analyze how this energy is transformed into kinetic energy when the spring is released.   14

16. (a) Evaluate the effectiveness of using free-body diagrams to solve problems involving forces. Illustrate your answer with a specific example involving a block on a flat surface.   7

    (b) Explain the concept of equilibrium in the context of a hanging Board. What forces are acting on the Board, and how do they relate to each other? Include a free-body diagram in your answer.   7