

First Semester FYUGP Degree (Reg) Examination (Deficiency Credit) April 2026

KU1DSCPHY112 - BASIC MECHANICS

2024 Admission onwards

Time : 1.5 hours

Maximum Marks : 50

Section A

Answer any 6 questions. Each carry 2 marks.

1. Define force and give its SI unit.
2. Write down the mathematical form of Newton's Second Law of Motion.
3. Write the expression for the gravitational force near the surface of the Earth.
4. What is the escape velocity for an object near Earth's surface?
5. Define conservative and non-conservative forces with examples.
6. Explain the principle of conservation of momentum.
7. How is rotational motion related to translational motion?
8. Explain the relationship between torque and rotational inertia.

Section B

Answer any 4 questions. Each carry 6 marks.

9. 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.
10. Calculate the power output required for an elevator to lift a load of 1000 kg to a height of 10 m in 5 seconds. Analyze how power is related to energy and time.
11. Write examples for Impulsive forces. Explain Impulse momentum theorem
12. A disk rotates with a constant angular acceleration of 2 rad/s^2 . Calculate the angular velocity after 5 seconds if it starts from rest.
13. Explain how angular momentum is conserved in a system of interacting bodies. Provide specific examples.
14. 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.

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Section C

Answer any 1 questions. Each carry 14 marks.

15. (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.
(b) Describe a scenario in which a car is accelerating. Using a free-body diagram, illustrate the forces acting on the car and analyze how Newton's second law applies to this situation.
16. (a) Apply Newton's law of gravitation to calculate the gravitational force between two masses. Discuss how this force changes with distance.
(b) Explain Newton's law of gravitation and derive an expression for gravitational potential energy between two masses. Discuss how this potential energy affects their motion.