

D. Voc
Mechanical Manufacturing
Subject: Applied Physics
Subject Code: PHY-401
Semester: Third
Session: - September 2022
Theory (External): 35 Marks
Time: 03 Hours

Instructions to the Students

1. This Question paper consists of two Sections. All sections are compulsory.
2. Section A comprises 10 questions of objective type in nature. All questions are compulsory. Each question carries one mark.
3. Section B comprises 8 essay type questions out of which students need to do any 5. Each question carries five marks.
4. Read the questions carefully and write the answers in the answer sheets provided.
5. Do not write anything on the question paper.
6. Wherever necessary, the diagram drawn should be neat and properly labelled

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SECTION –A (SHORT/OBJECTIVE TYPE QUESTIONS)
(10x1 = 10 Marks)

- A. If momentum (p), area (A) and time (T) are taken to be fundamental quantities, then energy has the dimensional formula :
(a) $(p^1 A^{-1} T^1)$ (b) $(p^2 A^1 T^1)$ (c) $(p^1 A^{-1/2} T^1)$ (d) $(p^1 A^{1/2} T^{-1})$
- B. The displacement of a particle is given by $x = (t - 2)^2$ where x is in metres and t in seconds. The distance covered by the particle in first 4 seconds is
(a) 4 m (b) 8 m (c) 12 m (d) 16 m
- C. Give example of a situation in which an applied force does not result in a change in kinetic energy
- D. Give the units and dimensions of gravitational field intensity.
- E. The vector sum of two forces is perpendicular to their vector differences. In that case, the forces
(a) are equal to each other (b) are equal to each other in magnitude (c) are not equal to each other in magnitude (d) cannot be predicted
- F. A satellite orbiting around earth in an orbit of radius R is shifted to an orbit of radius 2R. Times the time taken for one revolution will become (a) 8 times (b) 2 times (c) 2.5 times (d) 2.8 times
- G. A system absorbs heat Q and has an equal amount of positive work done on it. What is the change in the internal energy of the system? (a) 2Q (b) 0 (c) -2Q (d) Q/2
- H. In hot summer after a bath, the body's
a) internal energy decreases b) internal energy increases
c) heat decreases d) no change in internal energy and heat
- I. When a cycle tyre suddenly bursts, the air inside the tyre expands. This process is
a) isothermal b) adiabatic c) isobaric d) isochoric
- J. Define escape velocity.

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SECTION –B (ESSAY TYPE QUESTIONS)
(5x 5 = 25 Marks)

- Q.1 A car moving along a straight highway with speed of 126 kmh^{-1} is brought to a stop within a distance of 200 m. What is the retardation of the car (assumed uniform) and how long does it take for the car to stop?
- Q.2 Two forces whose magnitudes are in the ratio of 3:5 give a resultant of 35N. If the angle of inclination be 60° , calculate the magnitude of each force.
- Q.3 Derive the relation graphically $S = ut + at^2/2$, where symbols have their usual meanings.
- Q.4 State and explain Kepler's laws of planetary motion?
- Q.5 Show that the work done on a body by a force is equal to the change in its kinetic energy.
- Q.6 Derive an expression for gravitational potential energy of a body of mass m located at distance r from the centre of the earth.
- Q.7 The turbine pits at the Niagra falls are 50 m deep. The average horse power developed is 500. If the efficiency of the generator is 85%, how much water passes through the turbine per minute? Take $g = 10 \text{ ms}^{-2}$.
- Q.8 Explain the difference between Heat Engine and refrigerator.

====END OF PAPER====