T

COMMON HALF YEARLY EXAMINATION - 2025

Standard - 11

Reg. No. | | | | | | |

Time Allowed: 3.00 Hours

PHYSICS

PART-I

Maximum Marks: 70

I. Choose the correct answer: **15×1=15**

1) The velocity of a particle V at an instant t is given by $V = at + bt^2$. The dimensions of b is
   a) [L] b) $[LT^{-1}]$ c) $[LT^{-2}]$ d) LT^{-3}
2) When an object is at rest on the inclined rough surface,
   a) Static and Kinetic frictions acting on the object is zero.
   b) Static friction is zero but kinetic friction is not zero.
   c) Static friction is not zero and kinetic friction is zero.
   d) Static and kinetic frictions are not zero.
3) A body mass 1 kg is thrown upwards with a velocity 20 ms^{-1}. It momentarily comes to rest after attaining a height of 18m. How much energy is lost due to air friction? (Take g = 10 ms^{-2})
   a) 20 J b) 30 J c) 40 J d) 10 J
4) If a particle has negative velocity and negative acceleration, its speed
   a) increases b) decreases c) remains same d) zero
5) A constant retardation of 2.5 m/s^2 is applied to a body of mass 20 kg moving initially with a speed of 15 m/s. How long does the body take to stop?
   a) 2 sec b) 4 sec c) 6 sec d) 8 sec
6) A rope is wound around a hollow cylinder of mass 3 kg and radius 40 cm. What is the angular acceleration of the cylinder if the rope is pulled with a force 30N?
   a) 0.25 rad s^{-2} b) 25 rad s^{-2} c) 5 ms^{-2} d) 25 ms^{-2}
7) Find the torque about the origin when a force of $3\hat{j}$ N acts on a particle whose position vector is $2\hat{k}$ m
   a) $6\hat{j}$ Nm b) $-6\hat{i}$ Nm c) $6\hat{k}$ Nm d) $6\hat{i}$ Nm
8) The kinetic energy of the satellite orbiting around the Earth is
   a) equal to potential energy b) less than potential energy
   c) greater than kinetic energy d) zero
9) The wettability of a surface by a liquid depends primarily on
   a) Viscosity
   b) Surface tension
   c) Density
   d) Angle of contact between the surface and the liquid
10) In an isochoric process, we have
   a) W=0 b) Q=0 c) $\Delta U=0$ d) $\Delta T=0$
11) When a uniform rod is heated, which of the following quantity of the rod will increase
   a) mass b) weight
   c) center of mass d) moment of inertia
12) Which of the following gases will have least rms speed at a given temperature?
   a) Hydrogen b) Nitrogen c) Oxygen d) Carbondioxide
13) The average translational kinetic energy of gas molecules depends on
   a) Number of moles and T b) Only on T
   c) P and T d) P only

14) In a simple harmonic oscillation, the acceleration against displacement for one complete oscillation will be
a) An ellipse b) A circle
c) A parabola d) A straight line

15) Which of the following represents a wave?
a) $(x - vt)^3$ b) $x(x + vt)$ c) $\frac{1}{(x + vt)}$ d) $\sin(x + vt)$

Part-II

II. Answer any six questions and question number 24 is compulsory: **6×2=12**

16) Write the rules for determining significant figures. (Any four)
17) Define a radian.
18) State the empirical laws of static and kinetic friction.
19) Define Centre of mass.
20) What are geo stationary and polar stationary?
21) State Pascal's law in fluids.
22) Define one mole.
23) Define forced oscillation.
24) Calculate the workdone by a force of 30 N in lifting a load of 2 kg to a height of 10m. ($g = 10\ ms^{-2}$)

Part-III

III. Answer any six questions and question number 33 is compulsory: **6×3=18**

25) Write a note radar method to measure larger distances.
26) Explain various types of friction. Suggest a few methods to reduce friction.
27) Write the various types of potential energy. Write the formulae.
28) Discuss conservation of angular momentum with example.
29) State Kepler's three laws.
30) Define stress and strain.
31) State the first law of thermodynamics. Write its expression.
32) State the laws of simple pendulum.
33) Calculate the temperature at which the rms velocity of a gas triples its value at S.T.P (Standard Temp) $T_1 = 273K$.

Part-IV

IV. Answer the following questions: **5×5=25**

34) a) Discuss in detail the energy in simple harmonic motion. **(OR)**
b) Explain in detail the various types of errors.

35) a) Derive the Kinematic equations of motion for constant acceleration. **(OR)**
b) Describe the total degrees of freedom for mono atomic molecule, diatomic molecule and triatomic molecule.

36) a) Derive Mayer's relation for an ideal gas. **(OR)**
b) State and prove parallel axis theorem.

37) a) Explain the variation of g with depth from the Earth's surface. **(OR)**
b) State and explain work energy principle. Mention any three examples for it.

38) a) State Newton's three laws and discuss their significance. **(OR)**
b) Derive the expression for the terminal velocity of a sphere moving in a high viscous fluid using stokes force.

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