11ᵀᴴ STANDARD

MODEL QUESTION PAPER

PHYSICS

COMMON HALF YEARLY EXAM

[DURATION: 3HRS   MAXIMUM MARK: 90]

PART – 1

Note: (i) Answer all the questions.

(ii) Choose the most appropriate answer. (15X1=15)

1]. One of the combinations from the fundamental physical constants is $\frac{hc}{G}$. The unit of this expression is

(A). kg^2. (B). m^3 (C). s^{-1} (D). m

2]. Two masses m_1 and m_2 are experiencing the same force where $m_1 <$ m_2. The ratio of their acceleration $\frac{a_1}{a_2}$ is

(A). 1. (B). less than 1. (C). greater than 1. (D). all the three cases

3]. A uniform force of $(2\hat{i}+\hat{j})$ N displaces on a particle of mass 1kg. The particle displaces from position $(3\hat{i}+\hat{k})$ m. The work done by the force on the particle is

(A). 9J. (B). 10J. (C). 6J. (D). 12J.

4]. A planet moving along an elliptical orbit is closest to the sun at the distance r_1 and r_2. If v_1 and v_2 are linear points respectively. Then the ratio $\frac{v_1}{v_2}$ is

(A). $\frac{r_2}{r_1}$. (B). $(\frac{r_2}{r_1})^2$. (C). $\frac{r_1}{r_2}$. (D). $(\frac{r_1}{r_2})^2$.

5]. the dimension of a sphere of influence of a molecule is

(A). 1Å. (B). 10Å. (C). 100Å. (D). 0.1Å.

6]. an ideal refrigerator has a freezer at temperature -12°C. The coefficient of performance

(A). 50°C. (B). 45.2°C. (C). 40.2°C. (D).37.5°C.

7]. The slope at any point on the curve in PV graph for gas is g_n involving the reaction

(A). $\frac{dp}{P} = \frac{dV}{V}$.

(C). $\frac{dp}{p} = \frac{dV}{V}$

(B). $\frac{dp}{V} = \frac{dV}{P}$. .

(D). $\frac{dp}{V} = \frac{dV}{P}$.

8]. A spring is connected to a mass m suspended from it and its time period for vertical oscillation is T. The spring is now cut into two equal halves and the same mass is suspended from one of the halves. The period of vertical oscillation is

(A). $T' = \sqrt{2}T$.

(C). $T' = \frac{T}{\sqrt{2}}$.

(B). $\sqrt{2T}$.

(D). $\sqrt{\frac{T}{2}}$.

9]. Which one of the following represents a wave?

(A). $(x - vt)^3$.

(C). $\frac{1}{(x+vt)}$.

(B). $x(x + vt)$.

(D). $\sin(x + vt)$

10]. A pure substance would freeze or solidity at its

(A). Boiling point.

(C). Sublimation point.

(B). Melting point.

(D). Condensation point.

11]. The dimensions of a physical quantity X in the equation of force

$$= \frac{X}{Density}.$$

(A). $M^1L^4T^{-2}$.

(C). $M^2 L^{-2} T^{-2}$.

(B). $M^2L^{-2}T^{-1}$.

(D). $M^1 L^{-2} T^{-1}$.

12]. The unit vector in the direction of $\vec{A} = \hat{\imath}+\hat{\jmath}+\hat{k} \sqrt{9}$

(A). $\hat{\imath}+\hat{\jmath}+\hat{k}$.

(C). $\frac{\hat{\imath}+\hat{\jmath}+\hat{k}}{\sqrt{3}}$.

(B). $\frac{\hat{\imath}+\hat{\jmath}+\hat{k}}{\sqrt{2}}$.

(D). $\frac{\hat{\imath}+\hat{\jmath}+\hat{k}}{\sqrt{6}}$.

13]. A couple produces

(A). Pure rotation. (B). Pure translation. (C). Rotation and Translation

(D). No Motion.

14]. The kinetic energy of the satellite orbiting around earth is

(A). Equal to the potential energy.

(B). Less than potential energy.

(C). greater than kinetic energy.

(D). Zero.

15]. If the internal energy of an ideal gases and U and volume V are doubled, then the pressure of the gas

(A). Halves. (B). Quadruples. (C). Doubles. (D). Remains same.

PART – II

Answer any SIX questions (Q.no 24) is compulsory

(6X2=12)

16]. Explain the use of Vernier caliper in measuring smaller distances.

17]. State Wien's law.

18]. Define wavelength.

19]. What is meant by force constant spring.

20]. What is a cyclic process.

21]. State Hooke's law of elasticity.

22]. How will you prove that Earth itself is spinning.

23]. The mass and diameter of a planet are twice those of the earth. What will be the time period of that pendulum on this planet which is a second's pendulum on the earth?

24]. An artificial satellite is moving in a circular or bit around the earth with a speed equal to half the magnitude of escape velocity from the earth, determine the height of the satellite above the earth's surface $(g = 9.8 \text{ ms}^{-1})$.

PART III

Answer any SIX questions (Q.no 33) is compulsory.

(6X3=18)

25]. Define the degrees of freedom. Give an example.

26]. Find the dimensional formula of $\frac{hC}{G}$.

27]. Write down the expression for angle made by resultant acceleration and radius vector in non-uniform circular motion.

28]. Explain briefly how will you apply Newton's second law to a mango (mass 400g) hanging from a tree.

29]. Write down the equation of time period for linear harmonic oscillator.

30]. what is the relation between the velocity and temperature.

31]. what are the limitation do Dimensional Analysis.

32]. (i). Consider two sound waves with wavelengths 5m and 6m. If these two waves propagate in a gas with velocity 330ms^{-1}. Calculate the number of beats per second.

(ii). Two vibrating turning forks produce waves whose equation is given by $y_1 = 5 \sin(240\pi t)$ and $y_2 = 4\sin(244\pi t)$. Compute the number of beats per second.

33]. Derive an expression for pendulum length due to effect to temperature.

PART-IV

Answer all the Questions

(5x5=25)

34].

(A). Explain the principle of homogeneity of dimensions. What are its uses? Give example.

(OR).

(B). Find horizontal range and Time of flight projectile in horizontal projection and Derive expression maximum height, Time flight and range of a projectile.

35].

(A). Find acceleration and speed of the sliding object using free body diagram.

(OR).

(B). Derive velocities after the collision in the terms of velocities before collision in elastic collision in one dimension size.

36].

(A). State and prove parallel axis theorem.

(OR)

(B). Explain the freely falling apple on the earth using the concept of gravitational potential V(r).

37].

(A). Write the applications of Elasticity.

(OR).

(B). Explain in detail the Thermal Expansion.

38].

(A). Derive the expression of pressure exerted by the gas on the walls of the container

(OR).

(B). (i) what is an epoch.

(ii). Write down the Keller's the laws.