

EXAMINATION PAPER, 2020

Jharkhand Academic Council, Ranchi

PHYSICS-XI

Time : 1 Hour.]

[Full Marks : 40

General Instructions :

1. Write your Name, Roll Code, Roll No., Registration No., Faculty and Paper on the OMR Answer Sheet in the provided. Put your Full Signature on the OMR Answer Sheet in the space provided.
2. There are 40 Multiple Choice Questions in all.
3. All questions are compulsory. Each question carries 1 mark.
4. Four options are given for each question numbered 1 to 4. Choose the correct option and indicate it by blackening the appropriate circle (●) in the OMR Answer Sheet given separately. Use only Blue/Black Ball-Point Pen. **The use of Pencil is not allowed.**
5. Before leaving the examination hall hand over the OMR Answer Sheet to the invigilator. You are allowed to take the question paper with you.

1. Which of the following is the dimensional formula of pressure ?
(a) $[MLT^{-2}]$ (b) $[ML^{-2}T^{-2}]$ (c) $[ML^{-1}T^{-2}]$ (d) $[ML^{-1}T^{-1}]$
2. 1 metre is equivalent to :
(a) 10^{10} \AA (b) 10^8 \AA (c) 10^6 \AA (d) 10^5 \AA
3. The unit of torque is :
(a) N-m (b) $\text{kg m}^2 \text{ s}^{-1}$ (c) kg m s^{-1} (d) $\text{kg}^2 \text{ m}^2 \text{ s}^{-1}$
4. The dimensional formula of gravitational constant is :
(a) $[M^{-2}L^3T^{-2}]$ (b) $[M^{-2}L^2T^{-1}]$ (c) $[M^{-1}L^3T^{-2}]$ (d) $[ML^2T^{-1}]$
5. Which of the following is not a vector quality ?
(a) Displacement (b) Force (c) Angular momentum (d) Electric current
6. Maximum range of a projectile is :
(a) $\frac{u^2}{g}$ (b) $\frac{u^2}{2g}$ (c) $\frac{u^2}{3g}$ (d) $\frac{2u^2}{g}$
7. Area under velocity-time curve gives :
(a) Acceleration (b) Displacement (c) Uniform Velocity (d) None of these
8. A ball is dropped from the top of a tower and reaches the ground in 4 seconds. The height of the tower is :
(a) 40 m (b) 60 m (c) 80 m (d) 100 m
($g = 10\text{m/s}^2$)
9. A force of 0.04 newton acts on a body of mass 1 kg. The acceleration of the body is :
(a) 0.04 Nkg^{-1} (b) 0.4 Nkg^{-1} (c) 0.02 Nkg^{-1} (d) 0.2 Nkg^{-1}
10. The frictional force acting between two bodies is :
(a) directly proportional to the normal reaction (b) inversely proportional to the normal reaction
(c) directly proportional to mass (d) inversely proportional to mass
11. The centripetal force acting on a body undergoing circular motion is :
(a) $\frac{mw^2}{r}$ (b) mwr (c) $\frac{mv^2}{r}$ (d) $mv^2 r$

12. In the motion of rocket, the physical quantity conserved is :
 (a) Angular momentum (b) Linear momentum (c) Force (d) Work
13. A cyclist is moving in a circular path of radius 80 m with a velocity of 10m/s. His angle of bend with vertical is :
 ($g = 10 \text{ m/s}^2$)
 (a) $\tan^{-1}(4)$ (b) $\tan^{-1}\left(\frac{1}{8}\right)$ (c) $\tan^{-1}\left(\frac{1}{4}\right)$ (d) $\tan^{-1}(2)$
14. A body of mass m collides against a wall with velocity v and rebounds with the same speed. Its change in momentum is :
 (a) $2mv$ (b) mv (c) $-mv$ (d) zero
15. Work is represented by
 (a) $W = \vec{F} \times \vec{S}$ (b) $W = \vec{S} \times \vec{F}$ (c) $W = \vec{F} \cdot \vec{S}$ (d) none of these
16. A body is constrained to move in Y-direction. It is acted upon by a force $\vec{F} = (-2 \hat{i} + 15 \hat{j} + 6 \hat{k}) \text{ N}$. The work done by the force in moving the body through a distance of 10 m along Y-direction is :
 (a) 190 J (b) 160 J (c) 150 J (d) 20 J
17. Two bodies of masses m_1 and m_2 have equal kinetic energies. The ratio of their linear momentum is :
 (a) $m_1 : m_2$ (b) $m_2 : m_1$ (c) $\sqrt{m_1} : \sqrt{m_2}$ (d) $\sqrt{m_2} : \sqrt{m_1}$
18. The stored potential energy of a spring when stretched by 2 cm is u . If it is stretched by 8 cm, the potential energy stored is : <https://www.jharkhandboard.com>
 (a) $\frac{u}{4}$ (b) $4u$ (c) $8u$ (d) $16u$
19. A box is pushed through 4 m on a floor offering a resistance of 100 N. The work done by the resisting force is :
 (a) 400 J (b) -400 J (c) 25 J (d) -25 J
20. Analogue of force in rotational motion is :
 (a) Moment of inertia (b) Torque (c) Radius of gyration (d) Angular momentum
21. Moment of inertia of a solid sphere of mass M and radius R about the diameter is :
 (a) $\frac{2}{5} MR^2$ (b) $\frac{2}{3} MR^2$ (c) $\frac{7}{5} MR^2$ (d) $\frac{5}{3} MR^2$
22. When a torque acting on a system is zero, which of the following is constant ?
 (a) Force (b) Linear momentum (c) Impulse (d) None of these
23. The value of g at the centre of the earth is :
 (a) zero (b) $\frac{g}{4}$ (c) $\frac{g}{2}$ (d) g
24. The escape velocity from the surface of the earth is (R_e is radius of earth) :
 (a) $\sqrt{gR_e}$ (b) $\sqrt{2gR_e}$ (c) $\sqrt{3gR_e}$ (d) $\sqrt{4gR_e}$
25. Kepler's third law is also known as :
 (a) Law of orbits (b) Law of areas (c) Law of periods (d) None of these
26. Gravitational potential at a distance r from a body of mass M is :
 (a) $G \frac{M}{r}$ (b) $G \frac{M}{r^2}$ (c) $-G \frac{M}{r}$ (d) $-G \frac{M}{r^2}$
27. Within the elastic limit the relation between stress and strain is :
 (a) stress = strain (b) stress \propto strain (c) stress $\propto \frac{1}{\text{strain}}$ (d) stress = $\frac{1}{\text{strain}}$

28. A force of 60 N is applied on the tip of a nail of cross section 0.001cm^2 . The pressure on the tip of nail is :
 (a) $6 \times 10^8 \text{ Pa}$ (b) $6 \times 10^{-8} \text{ Pa}$ (c) $6 \times 10^4 \text{ Pa}$ (d) $6 \times 10^{-4} \text{ Pa}$
29. The molar specific heat at constant pressure of an ideal gas is $(7/2) R$. The ratio of specific heat at constant pressure to that at constant volume is :
 (a) $\frac{9}{7}$ (b) $\frac{7}{5}$ (c) $\frac{8}{7}$ (d) $\frac{5}{7}$
30. The temperature of a body in Celsius scale is 40°C . The temperature in Fahrenheit scale is :
 (a) 32°F (b) 72°F (c) 104°F (d) none of these
31. A gas is compressed isothermally to half of its volume. By what factor does the pressure of the gas increase ? ($\gamma = 1.4$)
 (a) 2 (b) 2.8 (c) 0.7 (d) 0.5
32. Energy associated with each degree of freedom per molecule is (K_B is Boltzmann constant) :
 (a) $\frac{3}{2} K_B T$ (b) $\frac{1}{2} K_B T$ (c) $K_B T$ (d) zero
33. The temperature of an ideal gas is increased from 120 K to 480 K. The rms velocity of gas molecules become :
 (a) Half (b) Double (c) Quadrupled (d) Cannot say
34. The kinetic energy of one mole of an ideal gas is $E = \frac{3}{2} RT$. The value of C_p is :
 (a) $0.5 R$ (b) $0.1 R$ (c) $1.5 R$ (d) $2.5 R$
35. Oxygen and hydrogen gas are at same temperature and pressure. The mass of oxygen molecules are 16 times more than the mass of hydrogen molecules. The ratio of their rms speeds is :
 (a) 2 (b) $\frac{1}{4}$ (c) 4 (d) 16
36. Avogadro's number is the number of molecules in :
 (a) one litre of a gas (b) one mole of a gas (c) one gram of a gas (d) one kg of a gas
37. The frequency of a second pendulum is :
 (a) 0.5 Hz (b) 1 Hz (c) 0.25 Hz (d) 2 Hz
38. A progressive wave is represented by $y = 5 \sin (100 \pi t - 2 \pi x)$ where x and y are in metre and t in second. The maximum particle velocity is :
 (a) $100 \pi \text{ m/s}$ (b) $200 \pi \text{ m/s}$ (c) $400 \pi \text{ m/s}$ (d) $500 \pi \text{ m/s}$
39. The Doppler's effect is applicable for :
 (a) Sound waves only (b) Light waves only
 (c) Both for sound waves and light waves (d) None of these
40. Speed of sound wave in air :
 (a) is independent of temperature (b) increases with increase in pressure
 (c) increases with the increase in humidity (d) decreases with the increase in humidity