Total Time: 3:00 Hours

Physics (Part-I)
(Fresh/New Course)

Total Marks: 85

Note: There are three sections in this paper i.e. Section A, B & C.

VERSION : B

Time Allowed: 20 Minutes   **"Section-A"**   Marks: 18

INSTRUCTIONS:
- Attempt this section on the MCQs Answer Sheet only.
- Use black ball point or marker for shading only one circle for correct option of a question.
- No mark will be awarded for cutting, erasing, over writing and multiple circles shading.

Q. 1. Choose the correct option i.e. A, B, C, or D.

1. The longer the pendulum, greater will be its .... $\uparrow T = 2\pi\sqrt{\frac{\ell\uparrow}{g}}$
   - (A) Frequency
   - ● Time period
   - (C) Mass
   - (D) Both A & B

2. The time period of a simple pendulum is 2 sec. If its length is increased by 4 times, then its T = ...
   - ● 8 sec
   - (B) 12 sec
   - (C) 4 sec
   - (D) 16 sec

3. The portion of a wave below the mean position is called ....
   - (A) Crest
   - ● Trough
   - (C) Wave length
   - (D) Amplitude

4. The principle of diffraction grating is based on the .... and diffraction of light waves.
   - (A) Reflection
   - (B) Refraction
   - ● Interference
   - (D) Both A & B

5. Maximum work can be obtained in .... process.
   - (A) Adiabatic
   - (B) Isochoric
   - (C) Cyclic
   - ● Isothermal

6. 2π radians = ...
   - (A) 360°
   - (B) 1 revolution
   - (C) 180°
   - ● Both A & B

7. Work can be expressed in terms of base units as ....
   - (A) $kg\ ms^{-2}$
   - ● $kg\ m^2.s^{-2}$
   - (C) $kg\ m^2.s^{-3}$
   - (D) $kg\ m^{-1}.s^{-2}$

8. The end point is usually called .... of the vector.
   - (A) Tail
   - (B) Origin
   - (C) Mid
   - ● Head

9. When moment arm "r" and force are parallel then Torque is ....
   - (A) Negative
   - (B) Maximum
   - ● Zero
   - (D) Minimum

10. The vertical component of velocity changes uniformly and is .... at highest point in projectile motion.
    - (A) Maximum
    - (B) Minimum
    - (C) Constant
    - ● Zero

11. If $\theta = 180°$ then work done is ....
    - (A) Positive
    - (B) Zero
    - ● Negative
    - (D) Maximum

12. In British Engineering system the unit of Power is ....
    - (A) Pascal
    - (B) Joule
    - (C) Watt
    - ● horse power

13. If momentum is increased by 20% then kinetic energy increases by ....
    - (A) 55 %
    - ● 44 %
    - (C) 77 %
    - (D) 66 %

14. The minimum required velocity to put a satellite into the orbit is called .... velocity.
    - ● Critical
    - (B) Terminal
    - (C) Angular
    - (D) Escape

15. Moment of inertia for a Ring or Thin walled cylinder is I = ...
    - (A) $\frac{1}{2}MR^2$
    - ● MR^2
    - (C) $\frac{2}{5}MR^2$
    - (D) $\frac{1}{12}MR^2$

16. The unit for a solid angle in three dimensional space is ....
    - (A) Radian
    - ● Steradian
    - (C) Candela
    - (D) Revolution

17. Bernoulli's equation is based upon law of conservation of ....
    - (A) Momentum
    - (B) Charge
    - (C) Mass
    - ● Energy

18. Density of air is ....
    - ● $1.2\ kg.m^{-3}$
    - (B) $1.2\ g.cm^{-3}$
    - (C) $11.2\ kg.m^{-3}$
    - (D) $11.2\ g.cm^{-3}$

Total Time: 2:40 Hours   **Physics (Part-I)**   Total Marks: 67

(Fresh/New Course)

"Section-B"   Marks: 40

Q. 2. Write short answers of any Ten (10) of the following parts. Each part carries equal marks.

(i) Show that the rate of change of angular momentum is equal to the torque.

(ii) Define terminal velocity and prove that $V_t \propto r^2$.

(iii) What will be the frequency of a simple pendulum if its length is 1m ?

(iv) Define and briefly explain Interference of sound waves.

(v) State and explain Brewster's law of Polarization.

(vi) The pressure in a gas cylinder containing hydrogen will leak more quickly than if it is containing oxygen. Why?

(vii) Define Error and its Types.

(viii) What is the minimum number of unequal vectors to result into a null vector? Explain with the help of diagram.

(ix) State and explain law of conservation of momentum.

(x) Define Projectile motion. Derive mathematical form for maximum height attained by projectile.

(xi) Show that work done along a closed path is zero.

(xii) Define and briefly explain vector product of two vectors.

(xiii) Show that $E = mc^2$ is dimensionally correct.

"Section-C"   Marks: 27

Note: Answer any Three (3) questions. Each question carries equal marks.

Q. 3. (a) Explain Laplace's correction in theoretical and experimental values of speed of sound in gas.

     (b) Light is incident normally on a grating which has 350 lines/mm. Find the wave length of spectral line for which the deviation in second order is $25°$.

Q. 4. (a) Define the molar heat capacities C_p and C_v for a gas, and show that $C_p - C_v = R$ for a mole of an ideal gas.

     (b) A 5gm mass at the end of a spring describes S.H.M with a period of 0.08 sec. Find the acceleration when displacement is 6 cm.

Q. 5. (a) State the equation of continuity. Show that $v \propto \frac{1}{A}$ where 'v' is the speed of fluid and 'A' is cross sectional area of the pipe.

     (b) An 80 kg Athlete runs upstairs in 6 sec. The vertical height of the stairs is 5480 cm. Calculate his power.

Q. 6. (a) Define centripetal acceleration. Show that $\vec{a_c} = -\omega^2 \vec{r}$.

     (b) A person on the sea shore observes that 68 waves reach the shore in 1 min. If the wave length is 12 m, find velocity of waves.