PHYSICS (Fresh) P-I	Paper Code	Roll No. of the Student						
Time: 20 Minutes Marks: 18	● ② ③							
Multiple Choice Questions 01 Mark for each		Serial No. Of the Answer Book _____						

Note:
) Attempting all MCQs is compulsory. This paper along with the OMR sheet must be returned to the superintendent after due time.
) Fill the circle Ⓐ Ⓑ Ⓒ Ⓓ, which one is correct with blue or black ball point, in this sheet as well as in separate OMR Sheet like ●
) If more than one circle in the OMR sheet is filled then no credit will be given to such answer.

SECTION-A

1. $\frac{1\ km}{1\ gm} = $ _____.
   Ⓐ $10^{-6}\ m$ ● μ Ⓒ 10^6 Ⓓ 10μ

2. Which one is a pair of SI base units?
   Ⓐ Ampere, Joule   ● Kilogram, Kelvin   Ⓒ Coulomb, Second   Ⓓ Meter, Newton

3. A person walks first 10 km north and 20 km east, then the resultant vector is _____.
   ● 22.36 km   Ⓑ 22.46 km   Ⓒ 25.23 km   Ⓓ 20.36 km

4. The dot product of vector $\vec{A}$ with itself is equal to _____.
   Ⓐ zero   Ⓑ A^2 Ⓒ AB   Ⓓ AB cos θ

5. The change of momentum is called _____.
   Ⓐ Acceleration   ● Force   Ⓒ Impulse   Ⓓ Power

6. What does not change when force is applied on a body?
   Ⓐ Velocity   ● Mass   Ⓒ Acceleration   Ⓓ Position

7. If momentum is increased by 20 % then K.E increases by _____.
   Ⓐ 77%   Ⓑ 66%   Ⓒ 55%   ● 44%

8. Work done will be negative when angle is _____.
   ● 180^0 Ⓑ 75^0 Ⓒ 90^0 Ⓓ 105^0

9. The angular and linear velocities are related as _____.
   Ⓐ $\vec{v} = \frac{\vec{w}}{\vec{r}}$ Ⓑ $\vec{v} = \vec{r}.\vec{w}$ ● $\vec{v} = \vec{r} \times \vec{w}$ Ⓓ $\vec{v} = \vec{w} \times \vec{r}$

10. The angular speed in radian per hours for daily rotation of our earth is?
    Ⓐ 4π Ⓑ 2π ● $\pi/12$ Ⓓ $\pi/6$

11. Bernoulli's equation is based upon law of conservation of: _____.
    Ⓐ Mass   ● Energy   Ⓒ Charge   Ⓓ Momentum

12. A certain pendulum has an iron bob. When the bob is replaced by a lead bob of the same size, it time period will _____.
    Ⓐ Increases   Ⓑ Decreases   Ⓒ Unchanged   Ⓓ Double

13. In an isolated system the total energy of vibrating mass and spring is _____.
    Ⓐ Low   ● Constant   Ⓒ Hight   Ⓓ Variable

14. Waves carry _____.
    Ⓐ Mass   Ⓑ Density   Ⓒ Momentum   ● Energy

15. The distance between adjacent node and anti-node is _____.
    Ⓐ $\lambda/4$ ● $\lambda/2$ Ⓒ $\lambda/6$ Ⓓ λ

16. Which one proves the transverse nature of light?
    Ⓐ Interference   Ⓑ Diffraction   ● Polarization   Ⓓ Refraction

17. Two bodies are said to be in thermal equilibrium if they have the same _____.
    ● Temperature   Ⓑ Amount of heat   Ⓒ Specific heat   Ⓓ Thermal capacities

18. Triple point of water is _____.
    Ⓐ $273.16^0 F$ Ⓑ $273.16^0 C$ ● $273.16 K$ Ⓓ $372.16 K$

Note: Time allowed for section B and C is 2 hours and 40 minutes.

SECTION "B"   Marks: 40

II. Attempt any TEN Parts out of the following. Each Part carries equal marks.

i. Why is the earth not in thermal equilibrium with the Sun?

ii. Can we apply Huygen's principle to radar waves?

iii. What is meant by the dual nature of light?

iv. Density of air is 1.2 $kg\ m^{-3}$. Change it into $gm\ cm^{-3}$.

v. Define vector product and give two examples.

vi. Explain why do buses and heavy trucks have large steering wheels?

vii. Aero 27^0C. $\left(r = 1.66\ and\ R = 8334\ \frac{j}{k\ mol}\right)$ plane while horizontally drops a bomb when reaches exactly above the target, but missed it. Explain:

viii. When an arrow is shot from its bow, it has K.E. From where does it get the K.E?

ix. Explain the significance of moment of inertia in rotatory motion.

x. Why does the pipe of paper squeezes when air is blown through it?

xi. A singer, holding a note of right frequency, can shatter a glass. Explain?

xii. Why does a sound wave travel faster in solid than in gases?

xiii. Show that $S = r\theta$

SECTION "C"   Marks: 27

Note: Attempt any THREE questions of the following. Each question carries equal Marks.

III. (a) What is elastic collision? Calculate final velocities of two elastically colliding bodies in one dimension.   5

(b) A 1500 kg car has its velocity reduced from 20 m/s to 15m/s in 30 sec. How large is retarding force?   4

IV. (a) Define terminal velocity of falling object. Using stocke's law, show that the terminal velocity of a spherical droplet is given by $V_t = \frac{2\rho g r^2}{9\eta}$.   5

V. (b) Velocity of water in 6 inch diameter pipe is $5\ ft\ s^{-1}$. Find the velocity in 3 inch diameter pipe, which connects with it both pipes flow full.   4

VI. (a) What is a simple pendulum? Show that the motion of a simple pendulum is simple harmonic.   5

(b) Find the speed of sound in Helium gas at $27^{\circ}C$. $\left(r = 1.66\ and\ R = 8334\ \frac{j}{k\ mol}\right)$ 4

VII. (a) What is a Carnot Heat Engine? Discuss different steps of Carnot cycle. Also derive expression for its efficiency?   5

(b) Find the efficiency of a Carnot's heat engine working between the steam and ice point.   4