

Physics

PR – XI (A-I-B5) (25)

۱۔ ہر سوال کے سامنے چار دائرے دیئے گئے ہیں۔ صرف صحیح جواب والا دائرہ بھر دیں۔

۲۔ دائروں کو شید (بھرنے) کے لیے نیلے یا کالے رنگ کا پن استعمال کریں۔

۳۔ جواب میں ایک سے زائد دائرے بھرنے سے جواب غلط تصور ہوگا۔

Time: 20 Min

SECTION-A

Marks: 18

- 1) In a practical machine, friction and air resistance contribute to energy losses in the form of:
☒ Heat and sound ☐ Kinetic energy
☐ Gravitational energy ☐ Work
- 2) If an object starts from rest and moves with constant angular acceleration of 2 rad/s^2 , its angular displacement after 4s is:
☐ 2 rad ☐ 4 rad ☒ 8 rad ☐ 16 rad
- 3) If a body is moving with linear speed of 16 m/s and angular speed 4 rad/s in a circle of radius 'r', where 'r' is:
☒ 2 m ☐ 3 m ☐ 4 m ☐ 5 m
- 4) The moment of inertia of a solid sphere of mass 5 kg and radius 2 m is:
☐ 4 kgm^2 ☒ 8 kgm^2 ☐ 10 kgm^2 ☐ 20 kgm^2
- 5) The property of a fluid which helps in maintaining the laminar flow of fluid is:
☒ Low viscosity ☐ High viscosity
☐ Low density ☐ High density
- 6) The time period (T) of a wave of angular frequency of 5 rad/s is:
☒ $\frac{2\pi}{5} \text{ s}$ ☐ $\frac{1}{5} \text{ s}$ ☐ $\frac{5}{2\pi} \text{ s}$ ☐ $\frac{\pi}{5} \text{ s}$
- 7) Two sound waves of same frequency arriving at same place at the same time having path difference $\frac{3\lambda}{2}$ produces:
☐ Beats ☒ Silence ☐ Loudness ☐ Echo
- 8) In Young's double slit experiment the first order dark fringe is

observed at:

☒ $m = 0$ ☐ $m = 1$ ☐ $m = 2$ ☐ $m = 3$

- 9) The internal energy of the system primarily depends on:
☐ Volume only ☐ Pressure only
☐ Temperature only ☒ Both pressure and volume
- 10) The supplementary unit among the given is;
☐ Joule ☐ Candela ☒ Radian ☐ Watt
- 11) The number of angles required to draw a vector in a plane is:
☒ One ☐ Two ☐ Three ☐ Four
- 12) The direction of the vector product $\vec{A} \times \vec{B}$ is given by:
☐ Parallel to $\vec{A}$ ☐ Parallel to $\vec{B}$
☒ Perpendicular to the plane containing $\vec{A}$ and $\vec{B}$
☐ Along with vector $\vec{A} + \vec{B}$
- 13) It is harder to turn a stubborn bolt with short spanner because:
☐ Weight decreases ☐ Friction increases
☐ Effort decreases ☒ Moment arm decreases
- 14) A stone is dropped from a height of 45 meters. The time it will take to reach ground is:
☒ 3 s ☐ 4 s ☐ 5 s ☐ 6 s
- 15) A truck and a car collide. The object that experiences a greater force during the collision is:
☐ Truck ☐ Car
☒ Both experience the same force
☐ Neither experiences any force
- 16) In a velocity-time graph, a line with a negative non-zero slope represents:
☐ Positive acceleration ☒ Negative acceleration
☐ Constant velocity ☐ Constant acceleration
- 17) If a force of 20 N acting at angle of 60° moves the object 10m then work done is:
☐ 434 J ☒ 100 J ☐ 40 J ☐ 20 J
- 18) If the velocity of an object is constant and the force applied is in

the same direction as the velocity, then the power delivered by the force is:

- ☐ Zero ☒ Constant ☐ Increasing ☐ Decreasing

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Note: Time allowed for Section-B and Section-C is 2 Hours and 40 minutes.

SECTION-B

Attempt any TEN parts. Each part carries FOUR marks.

- Q1: Describe how precision and accuracy differ, by giving two examples?
- Q2: Show that $F = G \frac{m_1 m_2}{r^2}$ is dimensionally correct.
- Q3: Find the magnitude and direction of the resultant vector for $\vec{A} = 2\hat{i} + 3\hat{j}$ and $\vec{B} = 4\hat{i} - 1\hat{j}$.
- Q4: What does the first condition of equilibrium state about the forces acting on an object in state of rest?
- Q5: Prove that work done in gravitational field doesn't depend on the path followed.
- Q6: Derive the mathematical expression for escape velocity in term of gravitational constant G , and radius of planet R .
- Q7: Describe the role of Bernoulli's principle in a perfume atomizer.
- Q8: Define terminal velocity and derive the relation for terminal velocity using Stokes Law.
- Q9: Define the terms rarefaction, compression, wavelength and velocity of a wave.
- Q10: Explain how the pressure of air and humidity in air affects the speed of sound?
- Q11: Derive the formula for the observed frequency when the observer is moving away from a stationary source.
- Q12: Discuss the propagation of a wave front in a uniform medium using Huygens principle.

Q13: Explain how the concept of diffraction supports the wave model of light?

SECTION-C

Note: Attempt any THREE questions. All questions carry equal marks.

Q14 (a) Define orbital speed and derive mathematical expression for the orbital speed of an artificial satellite.

(b) What should be the orbital speed to launch a satellite in a circular orbit 820km above the surface of the earth?

Q15 (a) Define projectile motion and derive mathematical expressions for its instantaneous velocity and time of flight.

(b) A cricket ball is hit with an initial velocity of 25 m/s at an angle of 30° above the horizontal ground. Calculate the maximum height it reaches.

Q16 (a) Find an expression for kinetic energy of a body executing SHM and explain what happens to K.E when displacement is zero?

(b) A body of mass 600 g executes SHM and completes one vibration in 1.2 s. Find its potential energy when the displacement is 12cm.

Q17 (a) What is a Carnot engine and what are the processes that take place during the Carnot cycle.

(b) A Carnot engine having efficiency 56% takes certain amount of heat from a source having temperature 560 K, converts a part of it into work and rejects the remaining towards the heat sink. Find the temperature of the heat sink.