



PHYSICS

BOOKS - GURUKUL BOOKS & PACKAGING

PHYSICS (HINGLISH)

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Section I

1. In simple harmonic motion, acceleration of the particle is zero, when its

A. velocity is zero

B. displacement is zero

C. both velocity and displacement are zero

D. both velocity and displacement are maximum

Answer: B



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2. Select and write the most appropriate answer from the given alternative for each sub-question :

As we move from the equator towards the pole, weight of a body

A. remains the same

B. becomes zero

C. decreases

D. increases

Answer: D



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3. Select and write the most appropriate answer from the given alternative for each sub-question :

Substances which break just after their elastic limit is reached are

A. ductile

B. brittle

C. malleable

D. plastic

Answer: B



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4. Select and write the most appropriate answer from the given alternative for each sub-question :

The dimensions of angular momentum are
.....

A. $[L^{-2}M^1T^{-1}]$

B. $[L^2M^1T^{-1}]$

C. $[L^1M^2T^1]$

D. $[L^2M^2T^{-2}]$

Answer: B



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5. The number of degrees of freedom for a rigid diatomic molecule is

A. 3

B. 5

C. 6

D. 7

Answer: C



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6. Select and write the most appropriate answer from the given alternative for each sub-question :

A wave is travelling in the negative direction of X-axis then its equation is

$$\text{A. } y = a \sin 2\pi \left(\frac{t}{T} - \frac{X}{\lambda} \right)$$

$$\text{B. } y = a \sin 2\pi n \left(t + \frac{X}{v} \right)$$

$$\text{C. } y = a \sin 2\pi \left(\frac{t}{T} + \frac{X}{v} \right)$$

$$\text{D. } y = a \frac{\sin(2\pi)}{T} \left(t + \frac{X}{\lambda} \right)$$

Answer: A



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7. Select and write the most appropriate answer from the given alternative for each sub-question :

A rectangular film of a liquid is 5 cm long and 4 cm wide. If the work done in increasing its area to

$7\text{cm} \times 5\text{cm}$ is 0.06 J, the surface tension of the solution is :

A. $0.02\text{J} / \text{m}^2$

B. $0.2\text{J} / \text{m}^2$

C. $2\text{J} / \text{m}^2$

D. $20\text{J} / \text{m}^2$

Answer: D



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8. Attempt any SIX :

What is geo -stationary satellite ? State its any 'two' uses .



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9. Attempt any SIX :

Define radius of gyration and give its physical significance.



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10. Attempt any SIX :

What is capillarity ? Give any 'two' applications of capillarity .



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11. Attempt any SIX :

Draw a neat and labelled diagram of Ferry's black body.



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12. Attempt any SIX :

The frequency of revolution of a particle performing circular motion changes from 60 r.p.m to 180 r.p.m in 20 seconds. Calculate the angular acceleration of the particle.



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13. At what height above the surface of the earth will the acceleration due to gravity be 25 % of its value on the surface of the earth ? Assume that the radius of the earth is 6400 km .



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14. Attempt any SIX :

A simple pendulum of length 1 m and mass 10 g oscillates freely with amplitude 2 cm. Find its potential energy (P.E.) at the extreme position.

$$(g = 9.8 \text{ m/s}^2)$$



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15. Attempt any SIX :

The length of an air column for a fundamental mode in a resonance tube is 16 cm and that for

second resonance is 5.25 cm. Find the end correction.



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16. Attempt any THREE :

Show that beats frequency is equal to frequency difference between two interfering waves.



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17. Attempt any THREE :

Derive an expression for strain energy. Hence show

that strain energy per unit volume is directly proportional to the square of the stress.



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18. Attempt any THREE :

Compare the rates of loss of heat by a black body at $627^{\circ} C$ and $327^{\circ} C$, if temperature of surrounding is $27^{\circ} C$.



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19. Attempt any THREE :

A meter gauge train is moving at 72 km/hr along a curved rail-way of radius of curvature 500m at a certain place. Find the elevation of the outer rail above the inner rail so that there is no side pressure on the rail. ($g = 9.8m / s^2$)



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20. Define an ideal simple pendulum. Show that motion of a simple pendulum under certain conditions is simple harmonic. Obtain an expression for its period.

A solid sphere of diameter 50 cm and mass 25 kg rotates about an axis through its centre. Calculate its moment of inertia. If its angular velocity changes from 2 rad/s to 12 rad/s in 5 seconds. calculate the torque applied.



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21. Draw the neat diagrams for modes of vibration of an air column in a pipe, when

- (i) the pipe is open at both ends, and
- (ii) the pipe is closed at one end.

Hence derive an expression for fundamental frequency in each case.

A horizontal circular loops of a wire of radius 0.02 m is lowered into crude oil and film is formed. The force due to the surface tension of the liquid is 0.0113N. Calculate the surface a tension of the crude oil. ($\pi = 3.142$)



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Section II

1. When a ray of light enters into water from air

.....

A. its wavelength decreases

B. its wavelength increases

C. its frequency increases

D. its frequency decreases

Answer: a



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2. The condition for destructive interference between two waves is that their phase difference should be

A. $0, \pi, 2\pi, \dots$

B. $0, 2\pi, 4\pi, \dots$

C. $\pi, 3\pi, 5\pi, \dots$

D. $\frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \dots$

Answer: c



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3. The resistance of an ideal ammeter is

A. low resistance

B. high resistance

C. infinite resistance

D. zero resistance

Answer: d



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4. Which logic gate corresponds to the logical equation $Y = \overline{A + B}$?

A. NAND

B. NOR

C. AND

D. Or

Answer: b



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5. In a photocell, increasing the intensity of incident light increases

- A. the stopping potential
- B. the photoelectric current
- C. the energy of the incident photons
- D. maximum kinetic energy of the photo-electron

Answer: b



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6. In series LCR circuit $Z = 3\ \Omega$, $X_L = 8\ \Omega$, $X_C = 4\ \Omega$,
the impedance of the circuit is:

A. $3\ \Omega$

B. $7\ \Omega$

C. $5\ \Omega$

D. $25\ \Omega$

Answer: c

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7. A microphone which converts sound into electrical signal is an example of

- A. a thermister
- B. a rectifier
- C. a modulator
- D. an electrical transducer

Answer: d

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8. State Gauss's theorem in electrostatics. State the expression for electric field intensity at a point outside an infinitely long charged conducting cylinder.



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9. What is Curie temperature? What happens above Curie temperature?



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10. Draw a neat and labelled diagram of earth's atmosphere .



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11. The optical path difference between two identical waves arriving at a point is 371λ . Is the point bright or dark ? If the path difference is 0.24mm , calculate the wavelength of light used.



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12. State Kirchhoff's laws in electricity.



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13. In a potentiometer the balancing length of the wire is found to be $2.5m$ for a cell of e.m.f. $1.5V$. Find the balancing length of the wire for another cell of e.m.f. $1.2V$ on the same potentiometer.



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14. A closely wound solenoid of 1000 turns and area of cross-section $2 \times 10^{-4} m^2$ carries a current of 1A. It is placed in a horizontal plane with its axis making an angle of 30° with the direction of uniform magnetic field of $0.16T$. Calculate the torque acting on the solenoid.



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15. The energy of an excited hydrogen atom is $-0.85eV$. Find the angular momentum of the electron.

$$(h = 6.63 \times 10^{-34} J. s. , \pi = 3.142, E_1 = -13.6eV)$$



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16. Explain the working of a transistor as a switch.



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17. State Einstein's photoelectric equation. Explain any two characteristics of photoelectric effect on the basis of this equation.



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18. The change in the wavelength of light when it travels from air to glass of refractive index 1.5 and the frequency of light $4 \times 10^{14} \text{ Hz}$ is



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19. In Young's double slit experiment the slits are 0.5 mm apart and interference is observed on a screen placed at a distance of 100 cm from the slits. It is found that the 9th bright fringe is at a distance of 8.835 mm from the second dark fringe from the centre of the fringe pattern. Find the wavelength of light used.



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20. What is series LCR resonant circuit ? Obtain the expression for impedance. Hence state the conditions for series resonance and derive the expression for resonant frequency .

A $10\mu F$ capacitor is connected with $100V$ battery. What would be the electrostatic energy stored ?



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21. Obtain an expression for energy of an electron in Bohr orbit. Hence obtain the expression for its binding energy.

A rectangular coil having 100 turns each of length 1 cm and breadth 0.5cm is suspended in radial magnetic induction 0.002 T. The torsional constant of suspension fiber is 2×10^{-8} Nm/degree. Calculate the current sensitivity of a moving coil galvanometer.



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