PHYSICS

BOOKS - GURUKUL BOOKS & PACKAGING PHYSICS (HINGLISH)

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Section I

1. In stationary wave, the distance between a node and its adjacent antinode is .....

A. λ

B. $\frac{\lambda}{4}$

C. $\frac{\lambda}{2}$

D. 2λ

Answer: B

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2. If the source is moving away from the observer, then the apparent frequency .....

A. will increase

B. will remain the same

C. will be zero

D. will decrease

Answer: D

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3. A particle of mass m performs vertical motion in a circle of radius r. Its potential energy at the highest point is ..... (g is acceleration due to gravity)

A. 2 mgr

B. mgr

C. 0

D. 3 mgr

Answer: A

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4. The compressibility of a substance is

A. Young's modulus

B. bulk modulus

C. modulus of rigidity

D. Poisson's ratio

Answer: B

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5. The phase difference between displacement and acceleration of a particle performing S.H.M. is

A. 2π rad

B. $\frac{\pi}{2}$ rad

C. π rad

D. $\frac{\pi}{4}$ rad

Answer: C

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6. The average kinetic energy of a molecule of a gas at absolute temperature T is proportional to

A. $\left(\frac{3}{2}\right)$ RT

B. $\left(\frac{3}{2}\right) K_B T$

C. $\left(\frac{2}{3}\right) RT$

D. $\left(\frac{3}{2}\right)\left(\frac{RT}{M}\right)$

Answer: B

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7. A thin ring has mass 0.25 kg and radius 0.5 m. Its moment of inertia about an axis passing through its centre and perpendicular to its plane is ..... .

A. $0.0625 kgm^2$

B. $0.625 kgm^2$

C. $6.25 kgm^2$

D. $62.5 kgm^2$

Answer: A

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8. State Kepler's II law of planetary motion (law of areas)

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9. State the assumptions of the kinetic theory of gases.

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10. Define moment of inertia. State its SI unit and dimensions.

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11. Centripetal and Centrifugal Force

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12. In Melde's experiment, when tension in the string is 10 g wt. then three loops are obtained. Determine the tension in the string required to obtain four leeps, if all other conditions are constant.

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13. Calculate the work done in increasing the radius of a soap bubble in air from 1 cm to 2 cm. The surface tension of soap solution is 30 dyne/cm. $(\pi = 3.142)$

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14. A flat curve an a highway has a radius of curvature 400 m. A car goes around a curve at a speed of 32 m//s. What is the

minimum value of coefficient of friction that will prevent the car from sliding ? $\left(g = 9.8 m / s^2\right)$

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15. A particle performing linear S.H.M. has maximum velocity of 25 cm/s and maximum acceleration of $100 cm / s^2$. Find the amplitude and period of oscillation. $(\pi = 3.142)$

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16. Derive Laplace's law for a spherical membrane.

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17. Law of conservation of angular momentum

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18. Calculate the strain energy per unit volume in a brass wire of length 3 m and area of cross-section 0.6 kg wt is applied to its free end.

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19. What if the decrease in weight of a body of mass 500 kg when it is taken into a mine of depth 1000 km ?

(Radius of earth $R = 6400km, g = 9.8m/s^2$)

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20. State of differential equation equation of linear simple harmonic motion. Hence obtain the expression for acceleration, velocity and displacement of a particle performing linear S.H.M. A body cools from $80^\circ C$ to $70^\circ C$ in 5 minutes and to $62^\circ C$ in the next 5 minutes. Calculate the temperature of the surroundings.

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21. Wavelengths of two notes in air are $\left(\frac{90}{175}\right)$ m and $\left(\frac{90}{173}\right)$ m. Each note produces four beats per second with a third note of a fixed frequency. Calculate the velocity of sound in air.

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Section Ii

1. The reflected waves from on ionsphere are .....

A. ground waves

B. sky waves

C. space waves

D. very high frequency waves

Answer: B

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2. In interference pattern, using two coherent sources of light, the fringe width is ..... .

A. directly proportional to wavelength.

B. inversely proportional to square of the wavelength.

C. inversely proprotional to wavelength.

D. directly proportional to square of the wavelength.

Answer: A

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3. The electric field at a distance r from a long wire having charge per unit length λ is

A. $E = \frac{2\pi\varepsilon_0\lambda}{Kr^2}$

B. $E = \frac{\varepsilon_0\lambda}{2\pi Kr^2}$

C. $E = \frac{\lambda}{2\pi\varepsilon_0 Kr}$

D. $E = \frac{4\pi\varepsilon_0\lambda}{Kr^2}$

Answer: C

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4. S.I. unit of potential gradient is

A. V cm

B. $\frac{V}{cm}$

C. V m

D. $\frac{V}{m}$

Answer: D

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5. The momentum associated with photon is given by ..... .

A. hv

B. $\frac{hv}{c}$

C. hE

D. $h\lambda$

Answer: B

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6. A pure semiconductor

A. an extrinsic semiconductor

B. an intrinsic semiconductor

C. p-type semiconductor

D. n-type semiconductor

Answer: B

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7. If a glass plate refractive index is 1.732 is to be used as a polariser, what would be the angle of refraction?

A. 30°

B. 45°

C. 60°

D. 90°

Answer: C

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8. State the conditions for constructive and destructive interference of light.

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9. State and explain Ampere's law.

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10. Draw a neat and labelled block diagram of a receiver.

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11. Define magnetization. Write its S.I. unit and dimensions.

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12. The electron in the hydrogen atom is moving with a speed of 2.5×10^6 m/s in an orbit of radius 0.5 $\mathring{A}$. Magnetic moment of the revolving electron is

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13. A capacitor of capacitance 0.5 μF is connected to a source of alternating e.m.f. of frequency 100 Hz. What is the capacitive reactance? $(\pi = 3.142)$

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14. Calculate the de-Broglie wavelength of an electron moving with one fifth of the speed of light. Neglect relativistic effects. $\left(h = 6.63 \times 10^{-34} J.\, s.\,, c = 3 \times 10^{8} m/s,\ \text{mass of electron} = 9 \times 10^{-31} kg\right)$

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15. In cyclotron, magnetic field of 1.4 Wb/m^2 is used. To accelerate protons, how rapidly should the electric field between the Dees be reversed?

$\left(\pi = 3.142, Mp = 1.67 \times 10^{-27} kg, 3 = 1.6 \times 10^{-19} C\right)$

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16. Draw a circuit diagram of a meter bridge used to determine the unknown resistance R of a given wire. Hence derive the expression for R in terms of the known resistance S.

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17. What is Zener diode? How is it used as voltage regulator?

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18. In a biprism experiment, light of wavelength 5200 Å is used to get an interference pattern on the screen. The fringe width changes by 1.3 mm when the screen is moved towards biprism by 50 cm. Find the distance between two virtual image of the slit.

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19. The refractive indices of water and diamond are $\frac{4}{3}$ and 2.42 respectively. Find the speed of light in water and diamond.

$\left(c = 3 \times 10^8 m/s\right)$

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20. Prove theoretically the relation between e.m.f. induced in a coil and rate of change of magnetic flux in electromagnetic induction. A parallel plate air condenser has a capacity of 20 μF. What will be the new capacity if:

(a) the distance between the two plates is doubled ?

(b) A marble slab of dielectric constant 8 is introduced between the two plates ?

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21. Draw a neat and labelled energy level diagram and explain Balmer series and Bracket series of spectral lines for hydrogen atom.

The work function for a metal suface is 2.2 eV. If light of wavelength 5000 Å is incident on the surface of metal, find the threshold frequency and incident frequency. Will there be an emmission of photoelectrons or not ?

$\left(c = 3 \times 10^{8} m/s, 1eV = 1.6 \times 10^{-19} J, h = 6.63 \times 10^{-34} J.s.\right)$

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