PHYSICS

BOOKS - SARAS PUBLICATION

MODEL QUESTION PAPER -3

Exercise

1. The ratio of the dimension of planck constant and that of moment of inertia is the dimension of .....

A. frequency

B. velocity

C. angular momentum

D. time

Answer:

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2. The momentum of a photon of energy 1 MeV is kg m/s will be

A. 0.33×10^{6}

B. 8×10^{-24}

C. 5×10^{-23}

D. 5×10^{-22}

Answer:

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3. If $\vec{a}$, $\vec{b}$, $and \vec{c}$ are three non-coplanar non-zero vecrtors, then prove that

$$\left(\vec{a}\cdot\vec{a}\right)\vec{b}\times\vec{c}+\left(\vec{a}\cdot\vec{b}\right)\vec{c}\times\vec{a}+\left(\vec{a}\cdot\vec{c}\right)\vec{a}\times\vec{b}=\left[\vec{b}\,\vec{c}\,\vec{a}\right]\vec{a}$$

A. always lies in the plane containing $\vec{a}+\vec{b}$

B. always lies in the plane containing $\vec{a}-\vec{b}$

C. can be zero

D. cannot be zero

Answer:

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4. The dimensions of $(\mu_0\varepsilon_0)^{-\frac{1}{2}}$ are :

A. $\left[\frac{L^1}{2}\frac{T^{-1}}{2}\right]$

B. $\left[LT^{-1}\right]$

C. $\left[L^{-1}T\right]$

D. $\left[\frac{L^{-1}}{2}T\frac{1}{2}\right]$

Answer:

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5. The average force necessary to stop a bullet of mass 20 g and $250m/s$ as it penetrates wood to a distance of 12 cm, is:

A. $5.2 \times 10^3 N$

B. $4.2 \times 10^3 N$

C. $3.2 \times 10^3 N$

D. $2.2 \times 10^3 N$

Answer:

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6. If the force on a rocket moving with a velocity of $300m/s$. is 210 N,then the rate combustion of fuel is ....

A. $10.7kg/s$

B. $1.4kg/s$

C. $0.7kg/s$

D. $0.07kg/s$

Answer:

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7. A force of (3i + 4j) Newton acts on a body and displaces it by (3i + 4j) m. The work done by the force is .....

A. 10 J

B. 16 J

C. 12 J

D. 25 J

Answer:

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8. The dimension of torque is

A. $\tau = rF\sin\phi$

B. $\tau = rF\cos\phi$

C. $\tau = rF\tan\phi$

D. $\tau = \frac{F\sin\phi}{r}$

Answer:

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9. A thin uniform rod length 1 and mass m is swinging freely about a horizontal axis passing through its end. Its maximum angular speed is omega . Its centre of mass rises to maximum height of .....

A. $\frac{I^2\omega^2}{3g}$

B. $\frac{I^2\omega^2}{2g}$

C. $\frac{I^2\omega^2}{6g}$

D. $\frac{I\omega}{6g}$

Answer:

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10. Force due to gravity is least at a latitude of .....

A. 0°

B. $\frac{\omega}{2}$

C. $\frac{\omega}{4}$

D. $\frac{\omega}{8}$

Answer:

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11. A particle of mass 10g is kept on the surface of a uniform sphere of mass 100 kg and radius 10 cm. Find the work to done against the gravitational force between them to take the particle is away from the sphere.

A. $13.34 \times 10^{-10} J$

B. $3.33 \times 10^{-10} J$

C. $6.67 \times 10^{-9} J$

D. $6.67 \times 10^{-10} J$

Answer:

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12. At the same temperature, the mean kinetic energies of molecules of hydrogen and oxygen are in the ratio of .....

A. $127^\circ C$

B. $527^\circ C$

C. $-73^\circ C$

D. $-173^\circ C$

Answer:

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13. For a given material the Young's modulus is 2.4 times that of rigidity modulus. Its poisson's ratio is .....

A. 2.4

B. 1.2

C. 0.4

D. 0.2

Answer:

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14. Universal gas constant is

A. $ergx^{\circ}C$

B. $joe\underline{}/K$

C. $\neq w \to n/cm^{\circ}C$

D. $dy \neq /^{\circ} C$

Answer:

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15. For a given ideal gas 6×10^5 J heat energy is supplied and the volume of gas is increased from 4 m^3 to $6m^3$ at atmospheric pressure . Calculate (a) the work done by the gas (b) Change in internal energy of the gas

(c) graph this process in PV and TV diagram

A. $\frac{2}{3}$

B. 0.4

C. -0.4

D. $-\frac{2}{3}$

Answer:

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16. One kg of a diatomic gas is at a pressure of $8 \times 10^4 Nm^{-2}$ the density of the gas if $4kg/m^g$ .What is the energy of the gas due to its thermal mole

A. $8 \times 10^4 J$

B. $3 \times 10^4 J$

C. $5 \times 10^4 J$

D. $6 \times 10^4 J$

Answer:

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17. Nitrogen is in equilibrium state at T = 421 K. Find the value of most probable speed V_{mp}

A. $250m/s$

B. $300m/s$

C. $150m/s$

D. $500m/s$

Answer:

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18. Two tuning forks have frequencies 450 Hz and 454 Hz respectively. On sounding these forks together, the time interval between successive maximum intensities will be .....

A. $\frac{1}{4}\sec$

B. $\frac{1}{2}\sec$

C. $1\sec$

D. $2\sec$

Answer:

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19. The potential energy of a particle executing simple harmonic motion at a distance X from the equilibrium position is proportional to .....

A. X

B. $\sqrt{X}$

C. X^3

D. X^2

Answer:

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20. Charge Q is given by displacement $\overrightarrow{r} = a\hat{i} + b\hat{j}$ in an electric field $\overrightarrow{E} = E_1\hat{i} + E_2\hat{j}$. The work done is ....

A. $Q(E_1a + E_2b)$

B. $Q\sqrt{(E_1a)^2 + (E_2b)}^2$

C. $Q(E_1 + E_2)\sqrt{a^2 + b^2}$

D. $Q\left(\sqrt{E_1^2 + E_2^2}\sqrt{a^2 + b^2}\right.$

Answer:

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21. An electric dipole placed in a non-uniform electric field at an angle θ experiences

A. a force but no torque

B. a force as well as a torque

C. a torque but no force

D. neither a force not a torque

Answer:

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22. A potentiometer consists of a wire of length 4m. And resistance 10Ω is connected to cell of emf 2V The potential difference per unit length of wire will be

A. $0.5V/m$

B. $10V/m$

C. $2V/m$

D. $5V/m$

Answer:

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23. Three equal resistors connected in series across a source of emf together dissipate 10 watt of power. What would be the power dissipated if the same resistors are connected in parallel across the same source of emf?

A. $45W$

B. $90W$

C. $80W$

D. $40W$

Answer:

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24. If a current carrying coil is placed in magnetic field $\vec{B}$ having magnetic moment M, then the value of torque acting on it is .....

A. $\vec{M} . \vec{B}$

B. $\vec{M} \times \vec{B}$

C. $\frac{\vec{B}}{\vec{M}}$

D. $\frac{\vec{M}}{\vec{B}}$

Answer:

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25. The field due to a long straight wire carrying a current I is proportional to .....

A. I

B. I^3

C. $\sqrt{I}$

D. $\frac{1}{I}$

Answer:

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26. Compute the current in the wire if a charge of 120 C is flowing through a copper wire in 1 minute.

A. 1×10^{-15}

B. 4×10^{-5}

C. 0.2×10^{-6}

D. 0.0

Answer:

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27. A current carrying loop lying in a magnetic field behaves like a ....

A. magnetic dipole

B. magnetic pole

C. magnetic material

D. non-magnetic material

Answer:

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28. The speed of electromagnetic waves in a vacuum is given by.....

A. $\frac{1}{\mu_0 \varepsilon_0}$

B. $\frac{1}{\sqrt{\mu_0 \varepsilon_0}}$

C. $\mu_0 \varepsilon_0$

D. $\sqrt{\mu_0 \varepsilon_0}$

Answer:

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29. The amplitude of the magnetic field part of a harmonic electromagnetic wave in vacuum is $B_0 = 510nT$, the amplitude of the electric field part of the wave is .....

A. $163NC^{-1}$

B. $173NC^{-1}$

C. $183NC^{-1}$

D. $153NC^{-1}$

Answer:

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30. Critical angle of light passing from glass to air is minimum for

A. Red

B. Green

C. Yellow

D. Violet

Answer:

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31. The focal length of the lens is ....

A. $5cm$

B. $10cm$

C. $15cm$

D. $20cm$

Answer:

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32. An electron of mass m and charge q is accelerated from rest in a uniform electric field of strength E. The velocity acquired by it as it travels a distance l is .....

A. $\left(\frac{2Eql}{m}\right)^{\frac{1}{2}}$

B. $\frac{2Eq}{m}l$

C. $\frac{2Em}{ql}$

D. $\frac{Eq}{ml}$

Answer:

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33. A radio transmitter operates at a frequency 1000 KHz and a power of 66 kw. Find the number of photons emitted per second

A. 10^{27}

B. 10^{28}

C. 10^{29}

D. 10^{30}

Answer:

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34. Which of the following atoms has the lowest ionisation potential?

A. ${}_{7}^{14}N$

B. ${}_{55}^{133}Cs$

C. ${}_{18}^{40}Ar$

D. ${}_{8}^{16}O$

Answer:

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35. The ground state energy of hydrogen atom is 13.6 eV. The energy needed to ionize H_2 atom from its second excited state.

A. $1.51eV$

B. $3.4eV$

C. $13.6eV$

D. $12.1eV$

Answer:

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36. The three lattice constants of a crystal are mutually perpendicular to one another. The nature of the crystal system ....

A. hexagonal

B. orthorhombic

C. tetragonal

D. cubic

Answer:

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37. In p-n-p transistor circuit, the collector current is 10 mA. If 90 % of the holes reach the collector. Find emitter and base currents

A. 2 mA

B. 1mA

C. 0 mA

D. 3 mA

Answer:

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38. $\left|\vec{A} \times \vec{B}\right|^2 + \left|\vec{A} . \vec{B}\right|^2$ is equal to

A. $(A+B)^2$

B. $(A-B)^2$

C. A^2B^2

D. $A^2 + B^2$

Answer:

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39. The displacement of a particle along the x-axis is given by $x = a\sin^2 \omega t$. The motion of the particle corresponds to

A. simple harmonic

B. on a straight line

C. on a circle

D. with constant acceleration

Answer:

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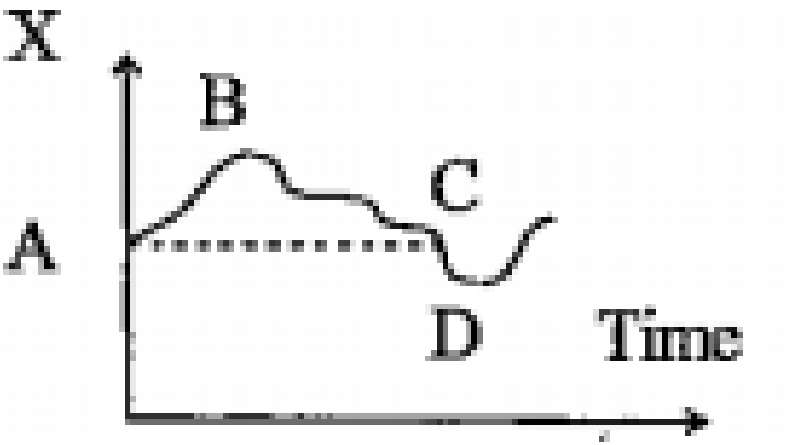
40. Between which two points, as indicated in positron-time graph of a particle undergoing one-dimensional motion, we can have zero displacement and a zero average velocity.



A. A and B

B. B and C

C. A and C

D. B and D

Answer:

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41. The time period of artificial satellite in a circular orbit of radius R is T. The radius of the orbit in which time period is 8T is:

A. 2R

B. 3R

C. 4R

D. 5R

Answer:

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42. The work function of a metal is 1.5 eV, light of wavelength $6600\overset{\circ}{A}$ is made incident on it. The maximum k.e. of emitted photo - electron is:

A. $0.6 \times 10^{-19} J$

B. $2.6 \times 10^{-19} J$

C. $1.6 \times 10^{-19} J$

D. $1.6eV$

Answer:

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43. The viscous force on a small sphere of radius R. moving in a fluid is directly proportional to:

A. R^2

B. R

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

D. $\frac{1}{R^2}$

Answer:

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44. In Boolean algebra, which of the following is not equal to zero:

A. $A.\overline{A}$

B. $A.0$

C. $A+\overline{A}$

D. $\overline{A}.0$

Answer:

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45. Focal length of a glass lens in air is 2 cm. Its focal length when immersed in water would be:

A. $4cm$

B. $6cm$

C. $8cm$

D. $12cm$

Answer:

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