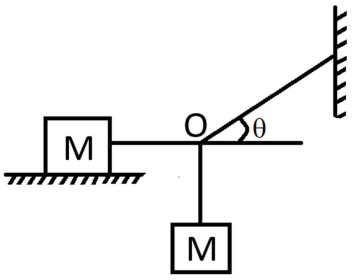
KCET-2025 TEST PAPER WITH ANSWER KEY
(HELD ON WEDNESDAY 16TH APRIL 2025)
PHYSICS (CODE : D4)

1. A wooden block of mass M lies on a rough floor. Another wooden block of the same mass is hanging from the point O through strings as shown in the figure. To achieve equilibrium, the co-efficient of static friction between the block on the floor with the floor itself is



(1) $\mu = \cot\theta$ (2) $\mu = \sin\theta$ (3) $\mu = \tan\theta$ (4) $\mu = \cos\theta$

Ans. 1

Solution:

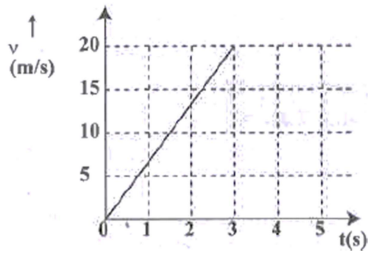
$T\sin\theta = Mg \quad .....(i)$

$T\cos\theta = \mu Mg \quad .....(ii)$

(ii) – (i) given

$$\mu = \frac{\cos\theta}{\sin\theta} = \cot\theta$$

2. A block of certain mass is placed on a rough floor. The coefficients of static and kinetic friction between the block and the floor are 0.4 and 0.25 respectively. A constant horizontal force F = 20 N acts on it so that the velocity of the block varies with time according to the following graph. The mass of the block is nearly (Take $g \simeq 10\,ms^{-2}$)



(1) 4.4 kg (2) 1.2 kg (3) 1.0 kg (4) 2.2 kg

Ans. 4

Solution:

Friction must be kinetic

$$a = \frac{v-u}{t} = \frac{20-0}{3} = \frac{20}{3} m/s^2$$

$F - f_k = ma$

$$20 - 0.25m \times 10 = m \times \frac{20}{3}$$

$m = 2.2$ kg

3. A body of mass 0.25 kg travels along a straight line from x = 0 to x = 2 m with a speed $\upsilon = k x^{3/2}$ where k = 2 SI units. The work done by the net during this displacement is

(1) 8 J (2) 16 J (3) 32 J (4) 4 J

Ans. 4

Solution:

$W_{net} = \Delta KE$

$$= \frac{1}{2}mv^2 - \frac{1}{2}mu^2$$

$$= \frac{1}{2} \times 0.25\left(k(2)^{3/2}\right)^2 - 0$$

$$= \frac{1}{2} \times 0.25 \times 2^2 \times 2^3$$

$= 4J$

4. During an elastic collision between two bodies, which of the following statements are correct ?

I. The initial kinetic energy is equal to the final kinetic energy of the system.

II. The linear momentum is conserved.

III. The kinetic energy during Δt (the collision time) is not conserved.

(1) II and III only (2) I and III only (3) I, II and III (4) I and II only

Ans. 3

Solution:

I. Final total kinetic energy equals initial

II. Linear momentum is always conserved

III. During collision kinetic energy gets parthy converted to potential energy

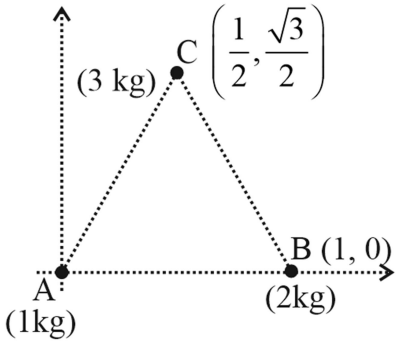
$\therefore$ All statements are correct

5. Three particles of mass 1 kg, 2 kg and 3 kg are placed at the vertices A, B and C respectively of an equilateral triangle ABC of side 1 m. The centre of mass of the system from vertex A (located at origin) is

(1) $\left(\frac{7}{12}, \frac{3\sqrt{3}}{12}\right)$ (2) $\left(\frac{9}{12}, \frac{3\sqrt{3}}{12}\right)$ (3) $\left(\frac{7}{12}, \frac{6+3\sqrt{3}}{12}\right)$ (4) (0, 0)

Ans. 1

Solution:



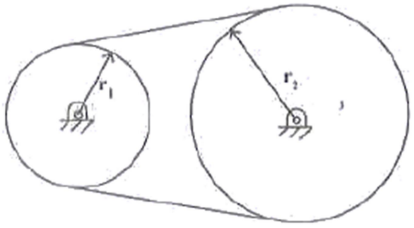
$$x_{cm} = \frac{\sum mixi}{\sum mi}$$

$$= \frac{1\times 0 + 2\times 1 + 3\times \frac{1}{2}}{6} = \frac{7}{12}$$

$$y_{cm} = \frac{\sum miyi}{\sum mi} = \frac{1\times 0 + 2\times 0 + 3\times \frac{\sqrt{3}}{2}}{6} = \frac{3\sqrt{3}}{12}$$

6. Two fly wheels are connected by a non-slipping belt as shown in the figure. $I_1 = 4\,kg\,m^2, r_1 = 20\,cm$, $I_2 = 20\,kg\,m^2$ and $r_2 = 30\,cm$. A torque of 10 Nm is applied on the smaller wheel. Then match the entries of column I with appropriate entries of column II.

I	Quantities	II	Their numerical Values (in SI units)
(a)	Angular acceleration of smaller wheel	(i)	$\frac{5}{3}$
(b)	Torque on the larger wheel	(ii)	$\frac{100}{3}$
(c)	Angular acceleration of larger wheel	(iii)	$\frac{5}{2}$



(1) a – ii, b – iii, c – i (2) a – iii, b – i, c – ii (3) a – ii, b – i, c – iii (4) a – iii, b – ii, c – i

Ans. 4

Solution:

$T_1 = I_1\alpha_1$ $\alpha_2 H_2 = \alpha_1 H_1$

$10 = \alpha_1 \times 4$ $\alpha_2 \times 0.3 = \frac{5}{2}\times 0.2$

$\therefore \alpha_1 = \frac{5}{2}SI$ $\alpha_2 = \frac{5}{3}SI$

$\therefore T_2 = I_2\alpha_2 = 20\times\frac{5}{3} = \frac{100}{3}SI$

7. If r_p, v_p, L_p and r_a, v_a, L_a are radii, velocities and angular momenta of a planet at perihelion and aphelion of its elliptical orbit around the Sun respectively, then

(1) $r_p > r_a, v_p > v_a, L_a > L_p$ (2) $r_p < r_a, v_p > v_a, L_a = L_p$

(3) $r_p > r_a, v_p < v_a, L_a = L_p$ (4) $r_p < r_a, v_p < v_a, L_a < L_p$

Ans. 2

Solution:

Angular momentum is conserved

$\therefore L_p = L_a$

Perihelion is point closet to the sun.

$\therefore r_p < r_a$

Also, $mv_p r_p = mv_a r_a$

$\therefore v_p > v_a$

8. The total energy of a satellite in a circular orbit at a distance (R + h) from the centre of the Earth varies as [R is the radius of the Earth and h is the height of the oribit from Earth's surface]

(1) $-\frac{1}{(R+h)}$ (2) $\frac{1}{(R+h)^2}$ (3) $-\frac{1}{(R+h)^2}$ (4) $\frac{1}{(R+h)}$

Ans. 1

Solution:

$$E_{tot} = -\frac{GMm}{2(Rth)}$$

9. Two wires A and B are made of same material. Their diameters are in the ratio of 1:2 and lengths are in the ratio of 1:3. If they are stretched by the same force, then increase in their lengths will be in the ratio of

(1) 3 : 4 (2) 2 : 3 (3) 3 : 2 (4) 4 : 3

Ans. 4

Solution:

$$\frac{F}{A} = y\frac{\Delta\ell}{\ell} \Rightarrow \Delta\ell = \frac{F\ell}{AY} = \frac{F\ell}{\pi r^2 y}$$

$$\therefore \frac{\Delta\ell_1}{\Delta\ell_2} = \left(\frac{\ell_1}{\ell_2}\right) \times \left(\frac{r_2}{r_1}\right)^2$$

$$= \frac{1}{3} \times \left(\frac{2}{1}\right)^2 = \frac{4}{3} \text{ or } 4:3$$

10. A horizontal pipe carries water in a streamlined flow. At a point along the pipe, where the cross-sectional area is 10 cm^{-2}, the velocity of water is 1 ms^{-1} and the pressure is 2000 Pa. What is the pressure of water at another point where the cross-sectional area is 5 cm^2 ?

[Density of water = 1000 kgm^{-3}]

(1) 300 Pa (2) 400 Pa (3) 500 Pa (4) 200 Pa

Ans. 3

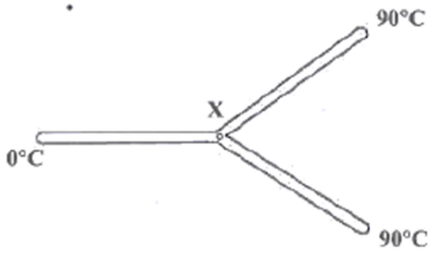
Solution:

$A_2V_2 = A_1V_1$ $\therefore V_2 = \frac{A_1V_1}{A_2} = \frac{10 \times 1}{5} = 2m/s$

$$P_2 + \frac{1}{2}PV_2^2 = P_1 + \frac{1}{2}PV_1^2$$

$$P_2 = 2000 + \frac{1}{2} \times 1000 \times \left(1^2 - 2^2\right) = 500Pa$$

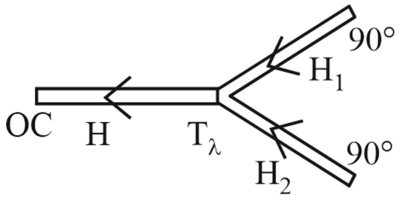
11. Three metal rods of the same material and identical in all respects are joined as shown in the figure. The temperatures at the ends of these rods are maintained as indicated. Assuming no heat energy loss occurs through the curved surfaces of the rods, the temperature at the junction x is



(1) 60° C (2) 30° C (3) 20° C (4) 45° C

Ans. 1

Solution:



Thermal let resistance of each rod be R & temperature of junction = T_x

$H = H_1 + H_2$

$\frac{T_x - 0}{R} = \frac{90 - T_x}{R} + \frac{90 - T_x}{R}$

$3T_x = 180$

$T_x = 60°C$

12. A gas is taken from state A to state B along two different paths 1 and 2. The heat absorbed and work done by the system along these two paths are Q_1 and Q_2 and W_1 and W_2 respectively. Then

(1) $W_1 = W_2$ (2) $Q_1 - W_1 = Q_2 - W_2$

(3) $Q_1 + W_1 = Q_2 + W_2$ (4) $Q_1 = Q_2$

Ans. 2

Solution:

$\Delta U = Q - W$ (By Ist law of thermodynamics)

$\Delta U_1 = \Delta U_2$

$Q_1 - W_1 = Q_2 - W_2$

13. At 27°C temperature, the mean kinetic energy of the atoms of an ideal gas is E_1. If the temperature is increased to 327°C, then the mean kinetic energy of the atoms will be

(1) $\frac{E_1}{\sqrt{2}}$ (2) $\sqrt{2}E_1$ (3) $2E_1$ (4) $\frac{E_1}{2}$

Ans. 3

Solution:

KE mean $\propto$ T. (T→temperature in kelris)

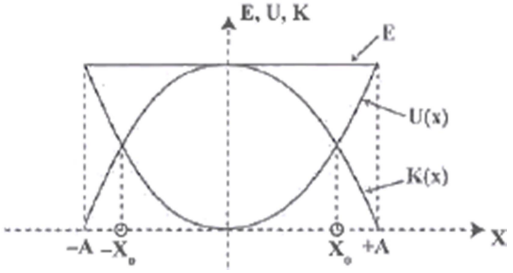
$\frac{E_1}{E_2} = \frac{T_1}{T_2}$

$$E_2 = E_1 \frac{T_2}{T_1}$$

$$= E_1\left(\frac{327+273}{27+273}\right)$$

$$= E_1\left(\frac{600}{300}\right) = 2E_1$$

14. The variations of kinetic energy K(x), potential energy U(x) and total energy as a function of displacement of a particle in SHM is as shown in the figure. The value of $|x_0|$ is



(1) 2A (2) $\frac{A}{\sqrt{2}}$ (3) $\sqrt{2}\,A$ (4) $\frac{A}{2}$

Ans. 2

Solution:

At X_0

KE = PE

$$\frac{1}{2}mw^2\left(A^2 - x^2\right) = \frac{1}{2}mw^2x^2$$

$$2x^2 = A^2$$

$$x = \frac{A}{\sqrt{2}} \qquad \boxed{x_0 = \frac{A}{\sqrt{2}}}$$

15. The angle between the particle velocity and wave velocity in a transverse wave is [except when the particle passes through the mean position]

(1) $\frac{\pi}{4}$ radian (2) $\frac{\pi}{2}$ radian (3) π radian (4) Zero radian

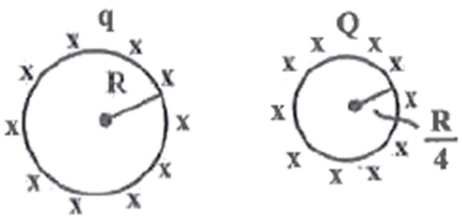
Ans. 2

Solution:

In transverse wave particle oscillates perpendicular to direction of propagation of wave.

Hence angle is $\frac{\pi}{2}$ radian .

16. A metallic sphere of radius R carrying a charge q is kept at certain distance from another metallic sphere of radius R/4 carrying a charge Q. What is the electric flux at any point inside the metallic sphere of radius R due to the sphere of radius R/4 ?



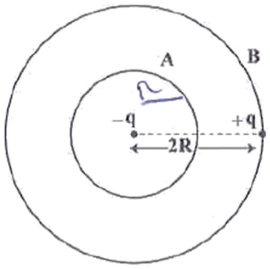
(1) $\frac{Q}{\varepsilon_0}-\frac{q}{\varepsilon_0}$ (2) Zero (3) $\frac{q}{\varepsilon_0}-\frac{Q}{\varepsilon_0}$ (4) $\frac{Q}{\varepsilon_0}$

Ans. 2

Solution:

Since spheres are electrostatically shielded from each other, $\phi = 0$.

17. You are given a dipole of charge + q and – q separated by a distance 2R. A sphere 'A' of radius 'R' passes through the centre of the dipole as shown below and another sphere 'B' of radius '2R' passes through the charge +q. Then the electric flux through the sphere A is



(1) q/ε_0 (2) Zero (3) $2q/\varepsilon_0$ (4) $-q/\varepsilon_0$

Ans. 4

Solution:

$$\phi_{sphere}A = \frac{\text{charge enclosed}}{\varepsilon_0}\left(\text{By gauss law}\right)$$

$$= \frac{-q}{\varepsilon_0}$$

18. A potential at a point A is – 3 V and that at another point B is 5V. What is the work done in carrying a charge of 5m C from B to A ?

(1) – 0.04 J (2) – 0.4 J (3) – 4 J (4) – 40 J

Ans. 1

Solution:

$W_{ext} = q\Delta V$

$= q\,(V_f - V_i)$

$= 5\times10^{-3}\left(V_A - V_B\right)$

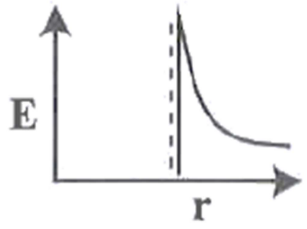
$= 5\times10^{-3}\left(-3,-5\right)$

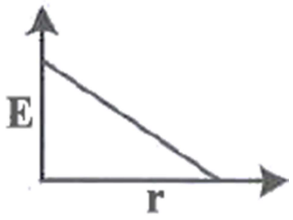
$= -8\times5\times10^{-3}\,J$

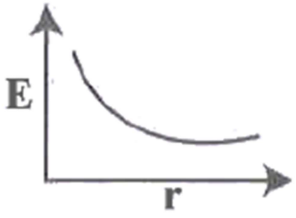
$= -40\times10^{-3}\,J$

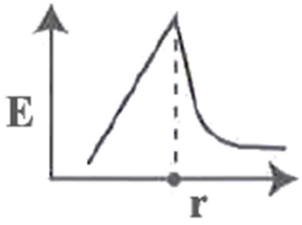
$= -0.04J$

19. Charges are uniformly spread on the surface of a conducting sphere. The electric field from the centre of sphere to a point outside the sphere varies with distance r from the centre as

(1) 

(2) 

(3) 

(4) 

Ans. 1

Solution:

For conducting sphere

$E = 0$ for $r < R$

$E = \frac{kQ}{r^2}$ for $r \geq R$

So graph must be (1)

20. Match Column-I with Column – II related to an electric dipole of dipole moment $\vec{p}$ that is placed in a uniform electric field $\vec{E}$.

Column – I Angle between $\vec{p}$ and $\vec{E}$	Column – II Potential energy of the dipole
a) 180° b) 120° c) 90°	i) –pE ii) pE iii) $\frac{1}{2}$ pE iv) Zero

(1) a – i, b – ii, c – iii (2) a – ii, b – iii, c – i (3) a – ii, b – i, c – iv (4) a – ii, b – iii, c – iv

Ans. 4

Solution:

PE of dipole = $-\vec{p}.\vec{E} = -pE\cos\theta$

(a) $\theta = 180°$ $PE = -pE\cos 180° = pE \rightarrow (ii)$

(b) $\theta = 120°$ $PE = -pE\cos 120° = -pE\left(\frac{-1}{2}\right) = \frac{pE}{2} \rightarrow (iii)$

(c) $\theta = 90°$ $PE = -pE\cos 90° = 0 \rightarrow (iv)$

a → (ii), b → (iii), c → (iv)

21. Which of the following statements is not true?

(1) Work done to move a charge on an equipotential surface is not zero

(2) Equipotential surfaces are the surfaces where the potential is constant

(3) Equipotential surfaces for a uniform electric field are parallel and equidistant from each other

(4) Electric field is always perpendicular to an equipotential surfaces.

Ans. 1

Solution:

Equipotential surface is having same potential at every point so work done in moving a charge from one point to other is O.

22. Which of the following is a correct statement?

(1) Gauss's law is true for any open surface

(2) Gauss's law is not applicable when charges are not symmetrically distributed over a closed surface.

(3) Gauss's law does not hold good for a charge situated outside the Gaussian surface.

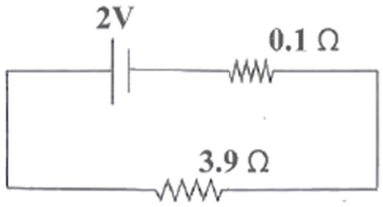
(4) Gauss's law is true for any closed surface

Ans. 4

Solution:

Gauss law is valid only for closed surface and charge should be enclosed inside the closed surface to get flux through the closed surface.

23. In the following circuit, the terminal voltage across the cell is



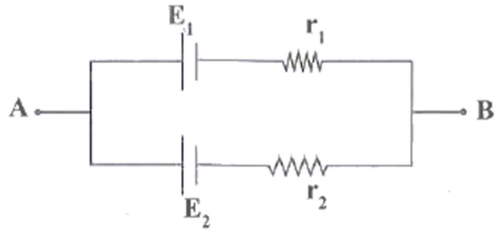
(1) 1.68 V (2) 1.95 V (3) 2.71 V (4) 0.52 V

Ans. 2

Solution:

$$i = \frac{2}{4} = \frac{1}{2}A \rightarrow \text{Terminal voltage} = 2 - \frac{1}{2} \times 0.1 = 1.95V$$

24. Two cells of emfs E_1 and E_2 and internal resistances r_1 and r_2 ($E_2 > E_1$ and $r_2 > r_1$) respectively, are connected in parallel as shown in figure. The equivalent emf of the combination is E_{eq}. Then



(1) $E_1 < E_{eq} < E_2$ and E_{eq} is nearer E_2

(2) $E_{eq} > E_2$

(3) $E_{eq} < E_1$

(4) $E_1 < E_{eq} < E_2$ and E_{eq} is nearer E_1

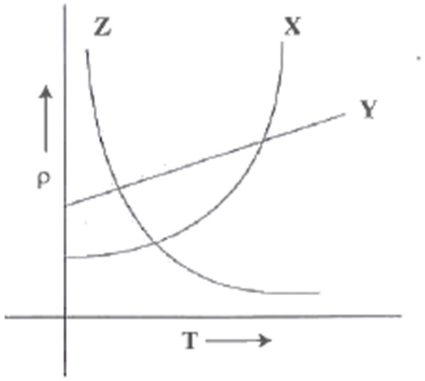
Ans. 4

Solution:

$$\varepsilon eq = \frac{\frac{\varepsilon 1}{r_1} + \frac{\varepsilon_2}{r_2}}{\frac{1}{r_1} + \frac{1}{r_2}} = \frac{\varepsilon_1 r_2 + \varepsilon_2 r_1}{r_1 + r_2}$$

Between E_1 & E_2.

25. The variations of resistivity ρ with absolute temperature T for three different materials X, Y and Z are shown in the graph below. Identify the materials X, Y and Z.



(1) X – copper, Y – semiconductor, Z – nichrome

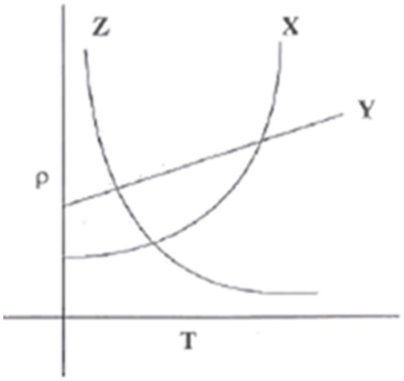
(2) X – semiconductor, Y – nichrome, Z – copper

(3) X – nichrome, Y – copper, Z – semiconductor

(4) X – copper, Y – nichrome, Z - semiconductor

Ans. 4

Solution:



X is copper, Y is nichrome, Z is semiconductor

26. Given, a current carrying wire of non-uniform cross-section, which of the following is constant throughout the length of wire?

(1) Drift speed

(2) Current and drift sped

(3) Current only

(4) Current, electric field and drift speed

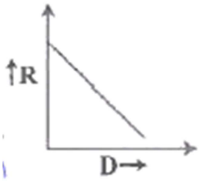
Ans. 3

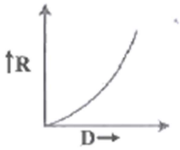
Solution:

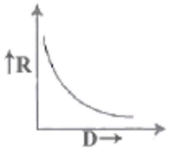
Current only

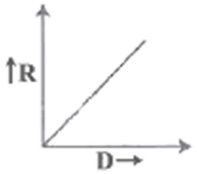
Current is every cross section is same irrespective of area of cross section

27. The graph between variation of resistance of a metal wire as a function of its diameter keeping other parameters like length and temperature constant is

(1) 

(2) 

(3) 

(4) 

Ans. 3

Solution:

$$R = \frac{\rho\ell}{A} = \frac{\rho\ell}{\pi r^2} \quad R\ \alpha \frac{1}{r^2}$$

28. Two thin long parallel wires separated by a distance 'r' from each other in vacuum carry a current of I ampere in opposite directions. Then, they will

(1) Attract each other with a force per unit length of $\frac{\mu_0 I^2}{2\pi r}$

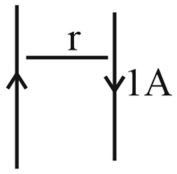
(2) Repel each other with a force per unit length of $\frac{\mu_0 I^2}{2\pi r}$

(3) Repel each other with a force per unit length of $\frac{\mu_0 I^2}{2\pi r^2}$

(4) Attract each other with a force per unit length of $\frac{\mu_0 I^2}{2\pi r^2}$

Ans. 2

Solution:



$$\frac{f}{\ell} = \frac{\mu_0 i, i_2}{t\pi r}$$

If they carry opposite currently they repeat each other

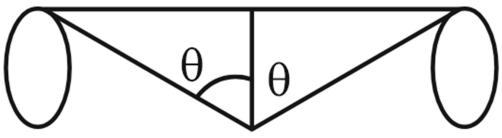
29. A solenoid is 1m long and 4 cm in diameter. It has five layers of windings of 1000 turns each and carries a current of 7A. The magnetic field at the centre of the solenoid is

(1) $0.4396\times10^{-5}\,T$ (2) $4.396\times10^{-2}\,T$ (3) $43.96\times10^{-2}\,T$ (4) 439.6 T

Ans. 2

Solution:

$\ell = 1m;\ r = 2cm;\ N = 5000;\ t = 7A;\ \sin\theta \approx 1$



$$B = \frac{\mu_0 Ni}{\ell}\sin\theta$$

$$B = \frac{4\pi \times 10^{-7} \times 5000 \times 7 \times 1}{1}$$

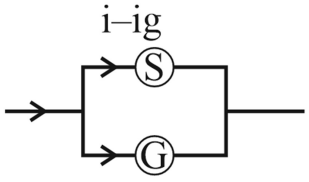
$$B = 4.396 \times 10^{-2} T$$

30. Two similar galvanometers are covered into an ammeter and a milliammeter. The shunt resistance of ammeter as compared to the shunt resistance of milliammeter will be

(1) Zero (2) More (3) Less (4) Equal

Ans. 3

Solution:



$$(i - i_g)s = i_g G$$

$$is = ig(h + s)$$

$$i = ig\left(\frac{g}{s} + 1\right)$$

More 'S', less i

So milliammeter will have more shunt resistance.

31. Which of the following statements is true in respect of diamagnetic susbtances?

(1) They are feebly attracted by magnets

(2) Permeability is greater than 1000

(3) Susceptibility decreases with temperature.

(4) Susceptibility is small and negative

Ans. 4

Solution:

Susceptibility of diamagnetic substance is small & negative

32. Identify the correct statement

(1) A current carrying conductor produces an electric field around it.

(2) A straight current carrying conductor has circular magnetic field lines around it.

(3) The direction of magnetic field due to a current element is given by Flemings Left Hand Rule

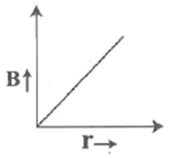
(4) The magnetic field inside a solenoid is non-uniform

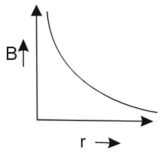
Ans. 2

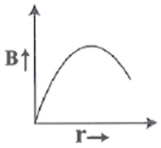
Solution:

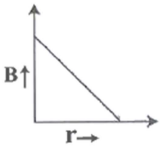
For a straight current carrying wire magnetic field lines forms circular loop around it.

33. Which of the following graphs represents the variation of magnetic field B with perpendicular distance 'r' from an infinitely long, straight conductor carrying current?

(1) 

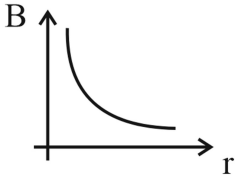
(2) 

(3) 

(4) 

Ans. 2

Solution:



$B = \frac{\mu_0 i}{2\pi r}$

$B\alpha\frac{1}{r}$ $\therefore$ Graph is rectangular hyperbola.

34. If we consider an electron and a photon of same de-Broglie wavelength, then they will have same

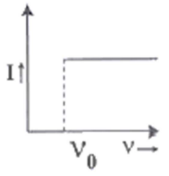
(1) Angular momentum (2) Energy (3) Velocity (4) Momentum

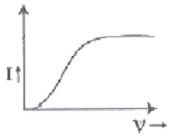
Ans. 4

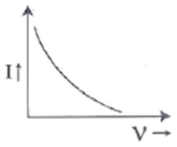
Solution:

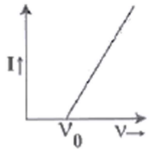
$\lambda = \frac{h}{p}$ if λ same then P i.e., momentum is same.

35. The anode voltage of a photocell is kept fixed. The frequency of the light falling on the cathode is gradually increased. Then the correct graph which shows the variation of photo current I with the frequency v of incident light is

(1) 

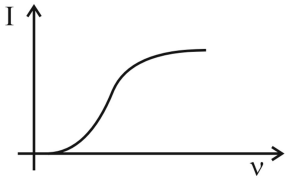
(2) 

(3) 

(4) 

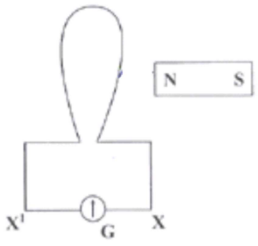
Ans. 1

Solution:



theoretical

36. When a bar magnet is pushed towards the coil, along its axis, as shown in the figure, the galvanometer pointer deflects towards X. When this magnet is pulled away from the coil, the galvanometer pointer



(1) Deflects towards X^1 (2) Does not deflect (3) Oscillates (4) Deflects towards X

Ans. 1

Solution:

According to lenz law should oppose the charge in flux. $\therefore$ deflects towards X'.

37. A square loop of side 2m lies in the Y-Z plane in a region having a magnetic field $\vec{B}=\left(5\hat{i}+3\hat{j}-4\hat{k}\right)T$. The magnitude of magnetic flux through the square loop is

(1) 20 Wb (2) 12 Wb (3) 16 Wb (4) 10 Wb

Ans. 1

Solution:

$\overline{A}=(2\times 2)\hat{i}$ [as loop is in y-z plane]

$=4\hat{i}$

$\overline{B}=5\hat{i}+3\hat{j}-4\hat{k}T$

$\therefore \phi=\overline{B}.\overline{A}=\left(5\hat{i}+3\hat{j}-4\hat{k}\right).4\hat{i}$

$=20Wb$

38. In domestic electric mains supply, the voltage and the current are

(1) AC voltage and DC current

(2) DC voltage and DC current

(3) DC voltage and AC current

(4) AC voltage and AC current

Ans. 4

Solution:

Domestic supply is AC voltage & AC current.

39. A sinusoidal voltage produced by an AC generator at any instant t is given by an equation V = 311 sin 314 t. The rms value of voltage and frequency are respectively

(1) 200V, 50 Hz (2) 220 V, 100 Hz (3) 220 V, 50 Hz (4) 200V, 100 Hz

Ans. 3

Solution:

$V = 311 \sin 314t$ $\quad V_{rms}=\frac{V_0}{\sqrt{2}}=\frac{311}{\sqrt{2}}=220V$

$W=2\pi f$

$314=2\pi f \Rightarrow f=50Hz$ [For sinusoidal AC]

40. A series LCR circuit containing an AC source of 100V has an inductor and a capacitor of reactances 24Ω and 16Ω respectively. If a resistance of 6Ω is connected in series, then the potential difference across the series combination of inductor and capacitor only is

(1) 80 V (2) 400 V (3) 8 V (4) 40 V

Ans. 1

Solution:

$X_C=24\Omega$

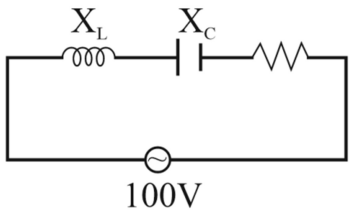
$X_L=16\Omega$

$R=6\Omega$

$Z=\sqrt{R^2+(X_C-X_L)^2}$

$=\sqrt{6^2+8^2}$

$=\sqrt{100}=10\Omega$



$i = \frac{V}{Z} = \frac{100}{10} = 10A$

Net voltage across capacitor and inductor

$= i(X_C - X_L)$

$=10(24-16)$

$=10(8)$

$=80V$

41. Match the following types of waves with their wavelength ranges

Waves	Wavelength ranges
i. Microwave	a. 700 nm to 400 nm
ii. Visible light	b. 1nm to 10^{-3} nm
iii. Ultraviolet	c. 0.1m to 1mm
iv. X-rays	d. 400 nm to 1 nm

(1) i-c, ii-a,iii-d, iv-b (2) i-d, ii-b, iii-c, iv-a (3) i-b, ii-c, iii-a, iv-d (4) i-a, ii-d, iii-b, iv-c

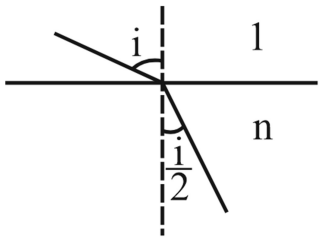
Ans. 1

42. A ray of light passes from vaccum into a medium of refractive index n. If the angle of incidence is twice the angle of refraction, then the angle of incidence in terms of refractive index is

(1) $\text{Sin}^{-1}\left(\frac{n}{2}\right)$ (2) $2\text{Cos}^{-1}\left(\frac{n}{2}\right)$ (3) $2\text{Sin}^{-1}\left(\frac{n}{2}\right)$ (4) $\text{Cos}^{-1}\left(\frac{n}{2}\right)$

Ans. 2

Solution:



$1 \times \sin i = n \sin\frac{i}{2}$

$2\sin\frac{i}{2}\cos\frac{i}{2} = n\sin\frac{i}{2}$

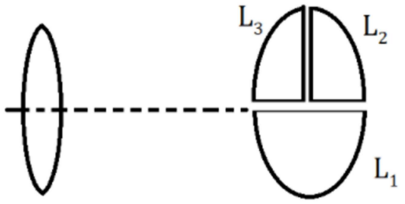
$2\cos\frac{i}{2} = n$

$\cos\frac{i}{2} = \frac{n}{2}$

$\frac{i}{2} = \cos^{-1}\left(\frac{n}{2}\right)$

$i = 2\cos^{-1}\left(\frac{n}{2}\right)$

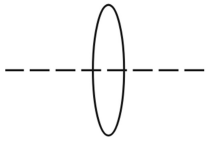
43. A convex lens has power P. It is cut into two halves along its principal axis. Further one piece (out of two halves) is cut into two halves perpendicular to the principal axis as shown in figure. Choose the incorrect option for the reported lens pieces



(1) Power of L_2 is $\frac{P}{2}$ (2) Power of L_3 is $\frac{P}{2}$ (3) Power of L_1 is P (4) Power of L_1 is $\frac{P}{2}$

Ans. 4

Solution:



$$P_2\frac{1}{F}=(\mu-1)\frac{2}{R}$$

Power of L1 $\nabla \rightarrow P_{L_1}=(\mu-1)\frac{2}{R}=P$

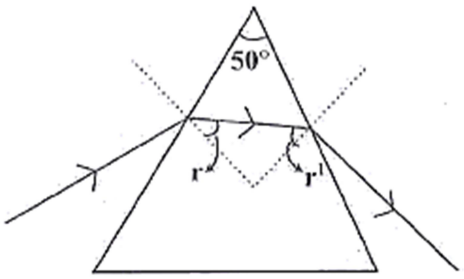
44. The image formed by an objective lens of a compound microscope is

(1) Real and diminished (2) Real and enlarged

(3) Virtual and enlarged (4) Virtual and diminished

Ans. 2

45. If r and r^1 denotes the angles inside the prism having angle of prism 50^o considering that during interval of time from t = 0 to t = t, r varies with time as $r=10°+t^2$. During the time r^1 will vary with time as



(1) $40°+t^2$ (2) $50°-t^2$ (3) $50°+t^2$ (4) $40°-t^2$

Ans. 4

Solution:

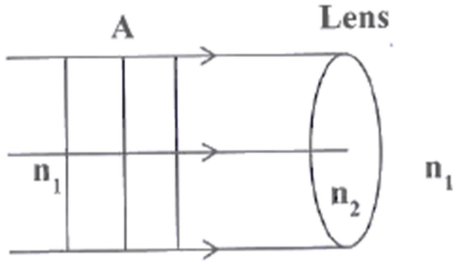
$r=r^1=50°$

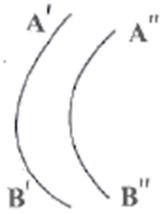
$10+t^2+r^1=50$

$r^1=50-10-t^2$

$=40-t^2$

46. If AB is incident plane wave front then refracted wave front in ($n_2 > n_1$)



(1) 

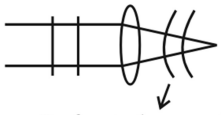
(2) 

(3) 

(4) 

Ans. 1

Solution:



Refracted wave front

47. The total energy carried by the light wave when it travels from a rarer to a non-reflecting and non-absorbing medium

(1) remains same

(2) increases

(3) either increases or decreases depending upon angle of incidence

(4) decreases

Ans. 1

48. If the radius of first Bohr orbit is r, then the radius of the second Bohr orbit will be

(1) 8r (2) 4r (3) $2\sqrt{2}r$ (4) 2r

Ans. 2

Solution:

$r\alpha\frac{n^2}{7}$

$N = 2; r_2 = 2^2r = 4r$

49. Match the following types of nuclei with examples shown

Column-I	Column-II
A. Isotopes	i. Li^7, Be^7
B. Isobars	ii. ${}_8O^{18}$, ${}_9F^{19}$
C. Isotopes	iii. ${}_1H^1$, ${}_1H^2$

(1) A-ii, B-iii, C-i (2) A-i, B-iii, C-ii (3) A-iii, B-ii, C-i (4) A-iii, B-i, C-ii

Ans. 4

Solution:

$\text{Isotopes}: {}_1H^1,\ {}_1H^2\ (\text{Same Z})$

$\text{Isobars}: {}_3Li^7,\ {}_4Be^7\ (\text{Same A})$

$\text{Isotone}: {}_8O^{18},\ {}_9O^{19}\ \text{Same}(A-Z)$

50. Which of the following statements is incorrect with reference of 'Nuclear force'?
(1) Nuclear force becomes attractive for nucleon distances larger than 0.8 fm
(2) Nuclear force becomes repulsive for nucleon distances less then 0.8fm
(3) Nuclear force is always attractive
(4) Potential energy is minimum, if the separation between the nucleons is 0.8 fm

Ans. 3

51. The range of electrical conductivity (σ) and resistivity (ρ) for metals, among the following, is

(1) $\rho \to 10^{-5} - 10^{-6}\Omega m$, $\sigma \to 10^{5} - 10^{-6} Sm^{-1}$
(2) $\rho \to 10^{11} - 10^{19}\Omega m$, $\sigma \to 10^{-11} - 10^{-19} Sm^{-1}$
(3) $\rho \to 10^{2} - 10^{8}\Omega m$, $\sigma \to 10^{-2} - 10^{-8} Sm^{-1}$
(4) $\rho \to 10^{-2} - 10^{-8}\Omega m$, $\sigma \to 10^{2} - 10^{8} Sm^{-1}$

Ans. 4

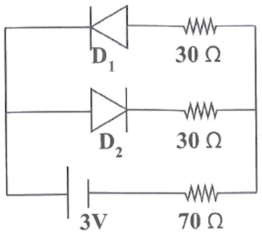
52. Which of the following statements is correct for an n-type semiconductor?
(1) The donor energy level lies closely above the top of the valance band
(2) The donor energy level lies at the half way mark of forbidden energy gap
(3) The donor energy level does not exist
(4) The donor energy level lies just the bottom of the conduction band

Ans. 4

Solution:

In an n-type semiconductor, donor impurities contribute electron energy levels high in the semiconductor band gap, allowing electrons to be easivy excited into the conduction b and. This donar level is located closed to, and just below, the bottom of the conduction band.

53. The circuit shown in figure contains two ideal diodes D_1 and D_2. If a cell of emf 3V and negligible internal resistance is connected as shown, then the current through 70Ω resistance, (in ampere) is



(1) 0.01 (2) 0.02 (3) 0.03 (4) 0

Ans. 3

Solution:

$D_1 \Rightarrow$ revere biased, $\Rightarrow$ act as open circuit

$D_2 \Rightarrow$ Forward biased

$R_{eq} = 30 + 70 = 100\Omega$

$$I \Rightarrow \frac{V}{R_{eq}} = \frac{3}{100} = 0.03A$$

54. In determining the refractive index of a glass slab using a travelling microscope, the following readings are tabulated

(a) Reading of travelling microscope for ink mark = 5.123 cm

(b) Reading of travelling microscope for ink mark through glass slab = 6.123 cm

(c) Reading of travelling microscope for chalk dust on glass slab = 8.123 cm

From the data, the refractive index of a glass slab is

(1) 1.500 (2) 1.601 (3) 1.399 (4) 1.390

Ans. 1

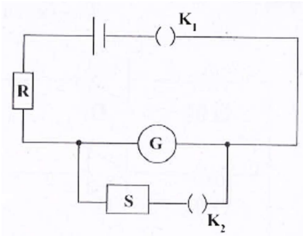
Solution:

Real depth = (8.123 – 5.123) = 3cm

Apparent depth = 8.123 – 6.123 = 2cm

$$n = \frac{R.D}{A.D} = 1.5$$

55. In an experiment to determine the figure of merit of a galvanometer by half deflection method, a student constructed the following circuit.



He unplugged a resistance of 5200Ω in R. When K_1 is closed and K_2 is open, the deflection observed in the galvanometer is 26 div. When K_2 is also closed and a resistance of 90Ω is removed in S, the deflection between 13 div. The resistance of galvanometer is nearly

(1) 45.0 Ω (2) 103.0 Ω (3) 91.6 Ω (4) 116.0 Ω

Ans. 3

Solution:

$$G = \frac{S'}{\frac{Q_1}{Q_2} - 1}$$

$$G = \frac{90}{\frac{26}{13} - 1}$$

$$\boxed{G = 90\Omega} \approx 91.6\Omega$$

56. While determining the coefficient of viscosity of the given liquid, a spherical steel ball sinks by a distance h = 0.9m. The radius of the ball $r = \sqrt{3} \times 10^{-3}\,m$. The time taken by the ball to sink in three trails are tabulated as follows.

Trial No.	Time taken by the ball to fall by h (in second)
1.	2.75
2.	2.65
3.	2.70

The difference between the densities of the steel ball and the liquid is 7000 kg m^{-3}. If g = 10ms^{-2}, then the coefficient of viscosity of the given liquid at room temperature is

(1) 0.14 Pa.s (2) 0.14×10^{-3} Pa. s (3) 14 Pa.s (4) 0.28 Pa.s

Ans. 1

Solution:

$$t_{avg} = \frac{2.75 + 2.65 + 2.70}{3} = 2.7\,sec$$

$$\text{Terminal velocity} = \frac{h}{t_{avg}}$$

$$V_t = \frac{1}{3} m/s$$

$$n = \frac{2}{9} \frac{\pi^2 g\left(S_{stell} - S_{liquid}\right)}{V_t}$$

$$n = 0.14\,Pa.S$$

57. Which of the following expression can be deduced on the basis of dimensional analysis? (All symbols have their usual meanings)

(1) $x = A\cos\omega t$ (2) $N = N_0 e^{-\lambda t}$ (3) $F = 6\pi\eta r v$ (4) $s = ut + \frac{1}{2}at^2$

Ans. 3

58. Two stones begin to fall from rest from the same height, with the second stone starting to fall 'Δt' seconds after the first falls from rest. The distance of separation between the two stones becomes 'H', 't_0' seconds after the first stone starts its motion. Then t_0 is equal to

(1) $\frac{H}{\Delta t} + \frac{\Delta t}{2g}$ (2) $\frac{H}{g\Delta t} - \frac{\Delta t}{2}$ (3) $\frac{H}{g\Delta t} + \frac{\Delta t}{2}$ (4) $\frac{H}{g\Delta t}$

Ans. 3

Solution:

$$S_1 = \frac{1}{2} g\, t_0^{\,2}$$

$$S_2 = \frac{1}{2} g\left(t_0 - 4t\right)^2$$

$$H = S_1 - S_2$$

$$= \frac{1}{2} g\, t_0^{\,2} - \frac{1}{2} g\left(t_0 - 4t\right)^2$$

$$H = gt_0 4t - \frac{1}{2}g4t^2$$

$$t_0 = \frac{H}{g\Delta t} = \frac{1}{2}\Delta t$$

59. In the projectile motion of a particle on a level ground, which of the following remains constant with reference to time and position?

(1) Average velocity between any two points on the path

(2) Horizontal component of velocity

(3) Angle between the instantaneous velocity with the horizontal

(4) Vertical component of the velocity of the projectile

Ans. 2

60. A particle is in uniform circular motion. The equation of its trajectory is given by $(x-2)^2 + y^2 = 25$, where x and y are in meter. The speed of the particle is $2ms^{-1}$, when the particle attains the lowest 'y' co-ordinate, the acceleration of the particle is (in ms^{-2})

(1) $0.4\hat{j}$ (2) $0.8\hat{i}$ (3) $0.8\hat{j}$ (4) $0.4\hat{i}$

Ans. 3

Solution:

$$(x-2)^2 + y^2 = 25$$

Equation of circle center ⇒ (2, 0)

$$r^2 = 25$$

$$r = 5$$

$$a_c = \frac{v^2}{R} = \frac{2^2}{5}$$

$$= 0.8\,m/s^2$$

$$\vec{a_e} = 0.8\hat{i}\ m/s^2$$

KCET-2025 16TH APRIL 2025

ANSWER KEY (CODE : D4)

PHYSICS

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	1	4	4	3	1	4	2	1	4	3	1	2	3	2	2
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	2	4	1	1	4	1	4	2	4	4	3	3	2	2	3
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	4	2	2	4	1	1	1	4	3	1	1	2	4	2	4
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	1	1	2	4	3	4	4	3	1	3	1	3	3	2	3

Assure Your Selection In

JEE MAIN & KCET

ALLEN

Join

ALLEN BENGALURU

NURTURE COURSE

Class X To XI Moving Student

Batch Starting From Phase -2

8th MAY 2025

JEE MAIN 2024

AIR 41

SAINAVANEET M

CLASSROOM

KCET 2024

RANK 3

ABHINAV P J

CLASSROOM

Result: KCET 2024

RANK 3	RANK 5	RANK 7	RANK 8	RANK 9	RANK 10
ABHINAV P J	ANIMESH S R	VIDEEP REDDY J	SHAWN T K	KARTHIKEYA S V	SAGAR V
4 Years Classroom	4 Years Classroom	3 Years Classroom	2 Years Classroom	3 Years Classroom	3 Years Classroom

RANK 13	RANK 14	RANK 15	RANK 20	RANK 29	RANK 30	RANK 39	RANK 40	RANK 42	RANK 50
ABHISHEK UPADHYA	HEMANTH M	AVANEESH P KURADE	ANSHUL GOYAL	AKASH SOMASUNDARAM	MADHAV ARUN KRISHNA	KRISHNAN R	PRAKET GOEL	ABHINAV PRASAD	DEVANSH TRIPATHI
Classroom	Classroom	Classroom	Classroom	Classroom	Classroom	Classroom	Classroom	Classroom	Classroom

06 In Top 10 Ranks | **16** In Top 50 Ranks | **34** In Top 100 Ranks | **101** In Top 500 Ranks

080-46704000

Bengaluru Campuses : Jayanagar | Marathahalli | Banaswadi | Hebbal | HSR Layout | Bannerghatta | Basaveshwara Nagar | Sarjapura | Jalahalli | Indiranagar | Whitefield | Electronic City | RR Nagar | Yelahanka