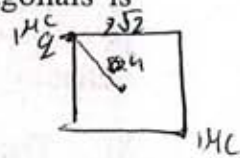
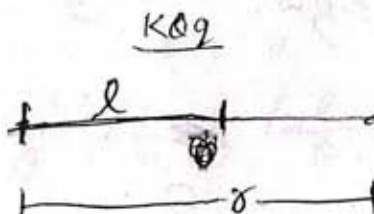


PHYSICS

- 1) One moving electron when comes closer to other stationary electron, then its kinetic energy and potential energy respectively _____ and _____.
- (A) increases, increases (B) increases, decreases
 (C) decreases, increases (D) decreases, decreases
- 2) An inclined plane of length 5.60 m making an angle of 45° with the horizontal is placed in an uniform electric field $E = 100 \text{ Vm}^{-1}$. A particle of mass 1 kg and charge 10^{-2} C is allowed to slide down from rest position from maximum height of slope. If the co-efficient of friction is 0.1, the time taken by the particle to reach the bottom is _____.
- (A) 1 s (B) 1.41 s
 (C) 2 s (D) None of these
- 3) Charges $1 \mu\text{C}$ are placed at each of the four corners of a square of side $2\sqrt{2} \text{ m}$. The potential at the point of intersection of the diagonals is _____ ($K = 9 \times 10^9 \text{ SI unit}$)
- (A) $18 \times 10^3 \text{ V}$ (B) 1800 V
 (C) $18\sqrt{2} \times 10^3 \text{ V}$ (D) None of these
- 4) A point charge q is situated at a distance r on axis from one end of a thin conducting rod of length L having a charge Q [Uniformly distributed along its length]. The magnitude of electric force between the two is _____.
- (A) $\frac{KQq}{r^2}$ (B) $\frac{2KQ}{r(r+L)}$
 (C) $\frac{KQq}{r(r-L)}$ (D) $\frac{KQq}{r(r+L)}$



(Space for Rough Work)



$$\frac{K \cdot 9 \times 10^9 \times 10^{-6} \times 10^{-6}}{16}$$

$$q:1 \quad \frac{v_1}{2v} = \frac{\lambda_2}{\lambda_1} \quad \left(\frac{v_1}{v_2}\right)^2 = \frac{\lambda_2}{\lambda_1} \quad \lambda \propto \frac{1}{v}$$

5) If alpha particle and deuteron move with velocity v and $2v$ respectively, the ratio of their de - Broglie wave length will be _____.

- (A) 2 : 1 (B) 1 : $\sqrt{2}$
 (C) 1 : 1 (D) $\sqrt{2}$: 1

6) de - Broglie wave length of atom at TK absolute temperature will be

- (A) $\frac{h}{\sqrt{3mKT}}$ (B) $\frac{h}{mKT}$
 (C) $\frac{\sqrt{2mKT}}{h}$ (D) $\sqrt{2mKT}$

7) If the wave length of light is 4000\AA , then the number of waves in 1 mm length will be _____. 10^{-9}m $\lambda = 4000$

- (A) 2500 (B) 25
 (C) 250 (D) 25000

8) The frequencies of X rays, γ rays and Ultra violet rays are respectively p , q and r then

- (A) $p > q, q > r$ (B) $p < q, q > r$
 (C) $p < q, q < r$ (D) $p > q, q < r$

9) Photons having energy 1eV and 2.5 eV successively incident on a metal having work function is 0.5 eV. The ratio of maximum speed of emitted electrons is

- (A) 2 : 1 (B) 1 : 2
 (C) 3 : 1 (D) 1 : 3

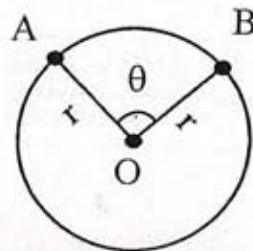
(Space for Rough Work)

$$W = 0.5\text{eV} \quad \frac{1}{2}mv^2$$

2

5

- 10) A and B are two points on a uniform ring of radius r . The resistance of the ring is R . $\angle AOB = \theta$ as shown in the figure. The equivalent resistance between points A & B is _____.



- (A) $\frac{R(2\pi - \theta)}{4\pi}$ (B) $\frac{R\theta}{2\pi}$
 (C) $R\left(1 - \frac{\theta}{2\pi}\right)$ (D) $\frac{R}{4\pi^2}(2\pi - \theta)\theta$

- 11) Two wires of equal length and equal diameter and having resistivities ρ_1 and ρ_2 are connected in series. The equivalent resistivity of the combination is _____.

- (A) $\frac{\rho_1 + \rho_2}{2}$ (B) $(\rho_1 + \rho_2)$
 (C) $\frac{\rho_1 \rho_2}{\rho_1 + \rho_2}$ (D) $\sqrt{\rho_1 \rho_2}$

(Space for Rough Work)

$$R + R.$$

$$\frac{\rho_1 l}{A} + \frac{\rho_2 l}{A}$$

12) Match the following two columns.

Column I		Column II	
a)	Electrical resistance	p)	$ML^3T^{-3}A^{-2}$
b)	Electrical potential	q)	$ML^2T^{-3}A^{-2}$
c)	Specific resistance	r)	$ML^2T^{-3}A^{-1}$
d)	Specific conductance	s)	None of these

(A) $a-q, b-r, c-p, d-s$

(B) $a-q, b-s, c-r, d-p$

(C) $a-p, b-q, c-s, d-r$

(D) $a-p, b-r, c-q, d-s$

$R = \frac{V}{I} = \frac{ML^2T^{-3}A^{-2}}{AT^{-1}} = ML^2T^{-3}A^{-1}$

13) Angle of minimum deviation for a prism of refractive index 1.5 is equal to the angle of prism of given prism. Then the angle of prism is _____

($\sin 48^\circ 36' = 0.75$)

(A) 80°

(B) $41^\circ 24'$

(C) 60°

(D) $82^\circ 48'$

14) A ray of light passes from a medium A having refractive index 1.6 to the medium B having refractive index 1.5. The value of critical angle of medium A is _____.

(A) $\sin^{-1} \sqrt{\frac{16}{15}}$

(B) $\sin^{-1} \left(\frac{16}{15} \right)$

(C) $\sin^{-1} \left(\frac{1}{2} \right)$

(D) $\sin^{-1} \left(\frac{15}{16} \right)$

(Space for Rough Work)

15) The power of plane mirror is _____.

(A) 0

(B) ∞

(C) 2D

(D) 4D

16) Light waves travel from optically rarer medium to optically denser medium. Its velocity decreases because of change in _____

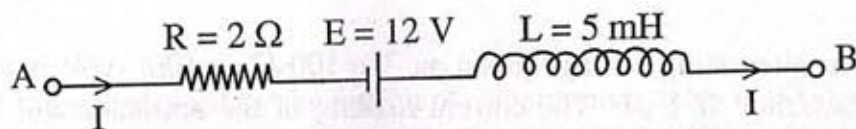
(A) wavelength

(B) frequency

(C) amplitude

(D) phase

17) The Network shown in Figure is a part of the circuit. (The battery has negligible resistance)



At a certain instant the current $I = 2 \text{ A}$ and it is decreasing at the rate of 10^2 As^{-1} . What is the potential difference between the points B and A?

(A) 8.5 V

(B) 8.0 V

(C) 10 V

(D) 15 V

18) A rod of 10 cm length is moving perpendicular to uniform magnetic field of intensity $5 \times 10^{-4} \text{ Wb/m}^2$. If the acceleration of the rod is 5 m/s^2 , then the rate of increase of induced emf is _____.

(A) $25 \times 10^{-4} \text{ Vs}$

(B) $2.5 \times 10^{-4} \text{ Vs}^{-1}$

(C) $20 \times 10^{-4} \text{ Vs}$

(D) $20 \times 10^{-4} \text{ Vs}^{-1}$

(Space for Rough Work)

$\mathcal{E} =$

$$B = 5 \times 10^{-4}$$

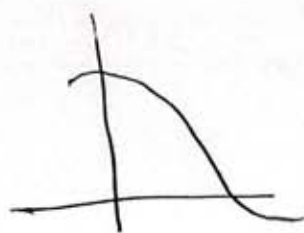
$$l = 10 \text{ cm} = 0.1 \text{ m}$$

$$F = \frac{m}{a}$$

$$a = \frac{m}{F}$$

- 19) A current of $\frac{25}{\pi}$ Hz frequency is passing through an A.C. circuit having series combination of $R = 100 \Omega$ and $L = 2 \text{ H}$, the phase difference between voltage and current is _____
- (A) 60° (B) 90°
(C) 30° (D) 45°
- 20) In A.C. circuit having only capacitor, the current _____
- (A) leads the voltage by $\frac{\pi}{2}$ in phase
(B) lags behind the voltage by $\frac{\pi}{2}$ in phase
(C) leads the voltage by π in phase
(D) lags behind the voltage by π in phase
- 21) An alternating voltage given as $V = 100\sqrt{2} \sin 100t$ volt is applied to a capacitor of $1 \mu\text{F}$. The current reading of the ammeter will be equal to _____ mA.
- (A) 20 (B) 10
(C) 40 (D) 80
- $C = 1 \mu\text{F}$
 $V =$
- 22) The distance of the closest approach of an alpha particle fired at a nucleus with kinetic energy K is r_0 . The distance of the closest approach when the α particle is fired at the same nucleus with kinetic energy $2K$ will be
- (A) $4r_0$ (B) $\frac{r_0}{2}$
(C) $\frac{r_0}{4}$ (D) $2r_0$

(Space for Rough Work)

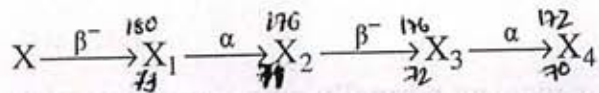


$$\frac{\frac{1}{2}mv^2}{\frac{1}{2}m}$$

23) Number of spectral line in hydrogen atom is

- (A) 8 (B) 6
(C) 15 (D) α

24) A radioactive element X disintegrates successively as under



If atomic number and atomic mass number of X are respectively 72 and 180, what are the corresponding values for X_4 ?

- (A) 69, 172 (B) 69, 176
(C) 71, 176 (D) 70, 172

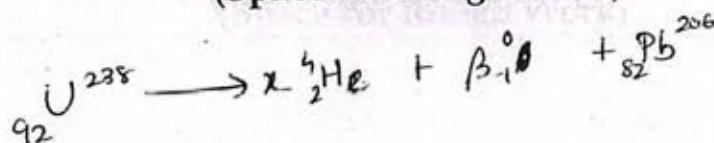
25) The energy released by the fission of one uranium atom is 200 MeV. The number of fission per second required to produce 6.4 W power is _____.

- (A) 2×10^{11} (B) 10^{11}
(C) 10^{10} (D) 2×10^{10}

26) If by successive disintegration of ${}_{92}\text{U}^{238}$, the final product obtained is ${}_{82}\text{Pb}^{206}$, then how many number of α and β particles are emitted?

- (A) 6 and 8 (B) 8 and 6
(C) 12 and 6 (D) 8 and 12

(Space for Rough Work)



$$238 = \frac{206}{32} \times x + y$$

$$92 = 82 + 16 - 6$$

30) In a N-P-N transistor about 10^{10} electrons enter the emitter in $2\mu\text{s}$, when it is connected to a battery. Then $I_E = \text{_____} \mu\text{A}$.

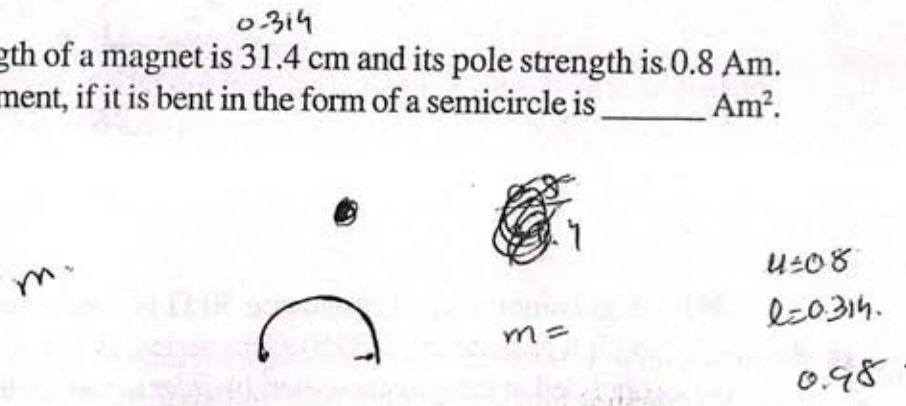
- (A) 400
- (B) 200
- (C) 800
- (D) 1600

~~2000~~

$$\frac{10^{10} \times 1.6 \times 10^{-19}}{2 \times 10^{-6}} = 8 \times 10^{-20+16}$$

31) The effective length of a magnet is 31.4 cm and its pole strength is 0.8 Am. The magnetic moment, if it is bent in the form of a semicircle is _____ Am^2 .

- (A) 1.2
- (B) 1.6
- (C) 0.16
- (D) 0.12



32) Equal currents are passing through two very long and straight parallel wires in the same direction. They will _____.

- (A) attract each other
- (B) repel each other
- (C) lean towards each other
- (D) neither attract nor repel each other



(Space for Rough Work)

✓ 36) Which gate can be obtained by shorting both the input terminals of a NOR gate.

(A) NOT

(B) OR

(C) AND

✓ (D) NAND

✓ 37) An optical fiber can offer a band width of _____.

✓ (A) 100 GHz

(B) 100 MHz

(C) 750 MHz

(D) 250 MHz

✓ 38) To transmit a signal of 3 KHz frequency, the minimum length of antenna is _____ km

✓ (A) 25

$$\frac{3 \times 10^3}{8 \times 10^3} = 10^5$$

(B) 20

$$\frac{25000}{4}$$

(C) 50

(D) 75

39) 27 identical drops of mercury are charged simultaneously with the same potential of 10 Volt. Assuming the drop to be spherical, if all the charged drops are made to combine to form one large drop, then its potential will be _____ Volt.

(A) 40

(B) 90

(C) 160

(D) 10

✓ 40) When 10^{19} electrons are removed from a neutral metal plate through some process, the charge on it becomes _____.

✓ (A) +1.6 C

(B) -1.6 C

(C) 10^{19} C

(D) 10^{-19} C

(Space for Rough Work)

$$10^{19} \times 1.6 \times 10^{-19}$$