INDIAN SCHOOL ALWADI ALKABIR

SECOND REHEARSAL EXAMINATION 2024-25

MARKING SCHEME

SET 1

[1][d.] resultant force is zero, resultant torque anti - clockwise

[2] [c.] direction B

[3] (a.) A will increase, V will decrease.

[4] [c.] magnetic flux density

[5] [b.] I = 2.2 sin [$100\pi t - \frac{\pi}{2}$]

[6] [d.] Microwaves

[7] [c.] 3 cm

[8] [d.] $\frac{-20}{9}$, 2.2 cm

[9] [a.] fringe width increases, separation increases

[10] [b.] reduced to half , increases by 4 times

[11] [b.] 1:1

[12] [a.]0.01Ev

[13] Ans. B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

[14] Ans. C. If Assertion is true but Reason is false.

[15] Ans. B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

[16] Ans. C. If Assertion is true but Reason is false.

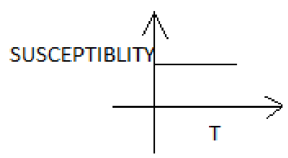
SECTION B

[17] relaxation time define [1/2]

Derive R = $\frac{m\ell}{ne^2\tau A}$ [1+1/2]

[18] [a.] fig.[i] diamagnetic & fig.[ii] paramagnetic

[b]



[19] Displacement current: [1]

Difference: [1]

[20] explain the refraction of light using wave theory.Fig. [1/2]

Steps [1]

Final answer [1/2]

[21] [a] nuclear density is same for all nuclei

Density = $\frac{m}{4/3\pi RO^3}$ = constant final result --[1/2 + 12]

[b] a plot of potential energy of a pair of nucleons labelled diagram---[1/2 + ½]]

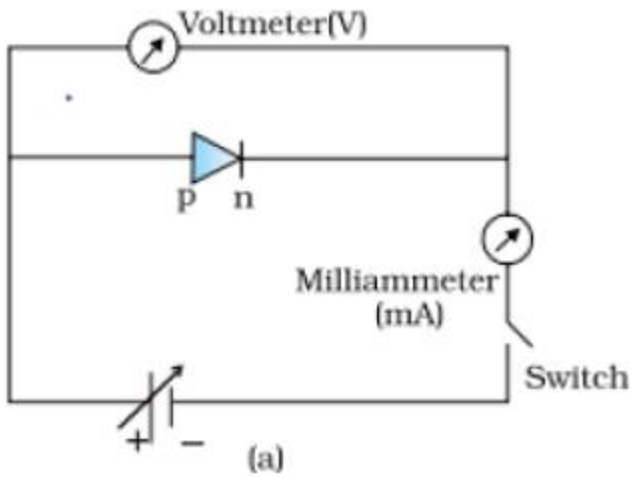
OR

[a] Diagram of binding energy per nucleon labelled diagram –[1/2 + 1/2]

[b] explain the release of energy in nuclear fission in terms of mass defect- [1/2 + 1/2]

[SECTION – C]

[22] [a] circuit diagrams V-I characteristics of a p-n junction diode.—[1/2]



[b] features of t (i) forward biasing, and (ii) reverse biasing [1/2 + 1/2]

[c] graph of V-I ---- [1/2]

knee voltage , zener voltage –[1/2 + 1/2]

[23] Q1 = $Q^{1}1$+ $Q^{1}2$ ---[1/2]

4000 μc = V[C1 + C2] --- [1/2]

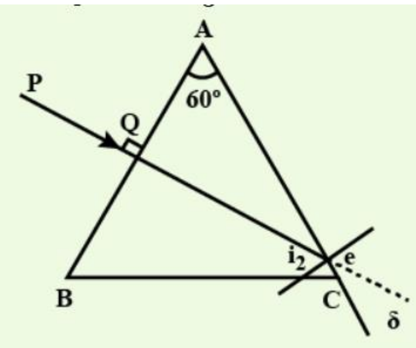
4000 μc = V[80 μF +320 μF]----[1/2]

Or V = 10V ---[1/2]

$Q^1 2 = C2\ V$ -----[1/2]

On   Sub $Q^1 2 = C2\ V = 320 \times 10 = 3200$μc---[1/2]

[24]



Ray diagram [1/2 + 1/2]

At M: $\text{Sin C} = \frac{1}{\mu} = \frac{\sqrt{3}}{2} = \sin 60°$ 1/2]

$\therefore C = 60°$ 1/2]

So the ray PM after refraction from the face AC grazes along AC.

$\therefore \angle C = 90°$ ---[1/2]

From $\angle i + \angle C = \angle A + \angle\delta$

Or $0° + 90° = 60° + \angle\delta$

$\therefore \delta = 90° - 60° = 30°$ [1/2]

[25]Doping ---[1]

$n_h \approx 5\times10^{22} / m^3$ ---[1/2 + 1/2]

$n_e = \frac{n_i^2}{n_h}$

$n_e = 4.5\times10^9 / m^3$ ----[1/2]

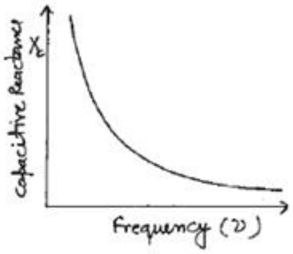
$n_h > n_e$, it is a p- type crystal --[1/2]

[26]

(a) Capacitor ---[1/2]

(b) $X_c = \frac{1}{\omega c}$ ---[1/2]

(c)



---[1]

(d) (i) For ac X_c is finite and therefore allows the ac to pass. --[1/2]

(ii) For dc X_c is infinite and therefore does not allow the dc to pass.--[1/2]

[27]

From photoelectric equation $h\nu = \phi_0 + eV_s$ --[1/2]

$= 2 + 0.55 = 2.55$ eV ---[1/2]

Given $E_n = -\frac{13.6}{n^2}$ ---[1/2]

The energy difference $\Delta E = -3.4 - (-2.55)\,eV = -0.85\,eV$ --[1/2]

$\therefore \frac{-13.6}{n^2} = -0.85$ --1/2]

$\because n = 4$ --[1/2]

OR

$1/\lambda B = R\{1/n^2f - 1/n^2i\}$[1/2]

For Balmer series,

For short wave length $n_i = \infty$ and nf = 2 and [1/2 +1/2]

[Lymann series]

For Lyman series, ni = ∞ and n_f= 1-[1/2 + ½]

$\lambda B = 3653 \times 10^{-10}$ m –[1/2]

[28] Gauss's law statement –[1]

Figure ---[1/2]

DERIVEwire of linear charge density 'λ' ---steps ----[1]

Final result ---[1/2]

[SECTION D]

[a][iii.] it remains stationary
[b] [iv.] the proton will continue to move with the same velocity long the axis
[c] [i.] when charge moves perpendicular to the Magnetic field[b] when charge moves parallel to the Magnetic field

[d] [b.] [4q$\hat{k}$ -6q $\hat{j}$] Newton

OR

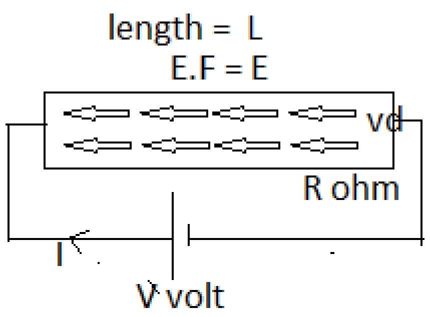
[iv.] 8N in -Z direction

[30] a) (iv) Zn, Cd and Mg have greater threshold frequency
[b] b) Stopping potential = 5V

[c] 16.5V
OR
[c] 2:1
[d][iv]4.5 x10^{14}Hz , 29.7 x10^{-20} J

SECTION E

[31][i]



In the presence of battery

fig- [$\frac{1}{2}$]

I = n A e V_d [$\frac{1}{2}$]

& V_d = $\frac{e\tau}{m}$ E ---[b]& E = $\frac{V}{L}$ [$\frac{1}{2}$]

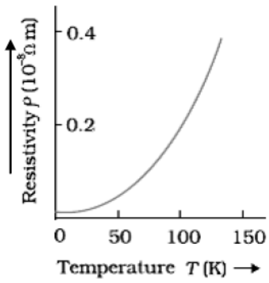
I = n A e^2 $\frac{\tau}{m}$ x $\frac{V}{L}$ [1]

$\frac{V}{I} = \frac{mL}{nA\tau e^2}$ [$\frac{1}{2}$]

But $R = \frac{mL}{nA\tau e^2}$ [$\frac{1}{2}$]

or $\frac{V}{I}$ = R , ohms law

[ii]

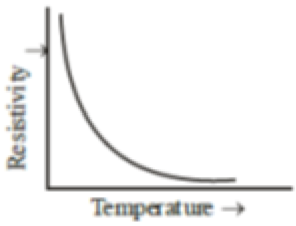


[$\frac{1}{2}$]

[iii]$V_d = \frac{e\tau}{m}\frac{V}{L}$, drift speed becomes 1/3 rd [$\frac{1}{2}+\frac{1}{2}$]

<u>OR</u>

[i]



[1/2]

[ii] [a] increases [$\frac{1}{2}$]

[b] decreases [$\frac{1}{2}$]

[iii]

Applying loop rule to both the lower and upper loops, we get $40\ I_3 + 20\ I_1 = 40$

$$40I_3 + 20I_2 = 80 + 40$$

Adding the two equations, we get

$$80I_3 + 20(I_1 + I_2) = 160$$

Or $80I_3 + 20\ I_3 = 160$

[$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$]

Or $I_3 = \frac{160}{100} = 1.6A$

Again, $40 \times 1.6 + 20I_1 = 40$

Or $20I_1 = 40 - 64 = -24$

Or $I_1 = -\frac{24}{20} = -1.2A$

$[\frac{1}{2} + \frac{1}{2}]$

[32]

(i) Coefficient of self induction is defined as the amount of magnetic flux associated with a coil when unit current flows through it.

Alternatively

It is defined as the magnitude of emf induced in a coil when current changes at the rate of 1 A/s through it.

Definition of coefficient of self induction [L] ----[1/2]

Figure ------[1/2]

Steps ---- [1]

$$L = \frac{\mu_0 N^2 A}{l}$$ -------[1/2]

$X_L = \omega L$ OR L = $\frac{X_L}{\omega}$ ----[a] $\omega = 2\pi f = 2\pi \frac{200}{\pi} = 400$ –[1/2]

Also Z = $\frac{V}{I}$ = $\frac{3}{0.5}$ = 6 ohm ---[1/2]

R = $\frac{V}{I}$ = $\frac{4}{1}$ = 4 OHM ---[1/2]

$6 = \sqrt{4^2 + X_L^2}$ or $X_L = 2\sqrt{5} = 4.5$ ohm -- [1/2]

[b] in [a] gives, L = $\frac{X_L}{\omega}$ = 0.01125 Henry ----[1/2]

<u>OR</u>

Principle --[1/2]

Fig – [1/2 + 1/2]

working of AC generator –[1/2]

E instantaneous derivation ----[1]

$e_o = BAN\omega$ --[1/2]

E = 100X0.8 x0.5 x 60 = 2400V ---[1/2]

Power dissipated , $P = \frac{\varepsilon_{rms}^2}{R}$

$= \frac{\left(\frac{2400}{\sqrt{2}}\right)^2}{100}$

= 28.8 kW ------[1]

33][A][i] the ray diagram ----[1]

derive the relation steps ---[2]

$\frac{\mu 2 - \mu 1}{R} = \frac{\mu 2}{v} - \frac{\mu 1}{u}$

[a]Diverging lens –[1/2]

Explanation based on formula---[1/2]

[b]converging lens ---[1/2]

Explanation based on formula---[1/2]

<u>OR</u>

[33] Ray diagram compound microscope in distinct vision adjustment. ---[1]

Derive an expression for magnifying power ---[2]

[2][i]M.P of astronomical telescope = M.P $= \frac{+fo}{-fe}$ = -12 [1]

[ii]L= fo + fe = 65cm --[1]