उत्तराखण्ड विद्यालयी शिक्षा परिषद्

केन्द्र संख्या की मुहर	केन्द्र व्यवस्थापक के हस्ताक्ष
इण्टर के० सं० 0801	

नोट–केन्द्र के नाम की मुहर उत्तरपुस्तिका के किसी भी भाग पर न लगाएं।

परीक्षार्थी द्वारा भरा जायेगा–

अनुक्रमांक (अंकों में)– 2 2 4 5 2 7 2 5

अनुक्रमांक (शब्दों में)– दो करोड़ चौबीस लाख अट्ठावन हजार सात सौ पच्चीस

विषय– Physics

प्रश्नपत्र संकेतांक– 429(IOW)

परीक्षा का दिन– Thursday

परीक्षा तिथि– 7/04/2022

कक्ष निरीक्षक द्वारा भरा जाय–

केन्द्र संख्या– 0 6 6 1

परीक्षा कक्ष संख्या– 1 4

उपरोक्त सभी प्रविष्टियों की जाँच मेरे द्वारा सावधानीपूर्वक कर ली गयी है।

कक्ष निरीक्षक का नाम– Mahadan Singh

दिनांक– 07-04-2022

हस्ताक्षर कक्ष निरीक्षक– Mahadan

प्रमाणित किया जाता है कि मैंने इस उत्तरपुस्तिका का मूल्यांकन समुचित प्रश्न-पत्र संकेतांक तथा मूल्यांकन निर्देशों के अनुसार किया है। प्राप्तांकों का मुखपृष्ठ पर अग्रसारण कर प्राप्तांकों एवं प्राप्तांकों के योग का मिलान कर लिया गया है। एवार्ड ब्लैंक में प्राप्तांकों की अंकना कर उनका पुनः मिलान भी कर लिया है। किसी भी प्रकार की त्रुटि के लिए मैं उत्तरदायी रहूँगा/रहूँगी।

परीक्षक के हस्ताक्षर एवं संख्या.....

1. अंकेक्षक के हस्ताक्षर एवं संख्या.....

2. अंकेक्षक के हस्ताक्षर एवं संख्या.....

सन्निरीक्षा प्रयोगार्थ

सन्निरीक्षा पूर्व अंक–

सन्निरीक्षा पश्चात् अंक–

त्रुटि का प्रकार–

दिनांक–

हस्ताक्षर निरीक्षक–

योग

Q1 Ans →

iii) Chadwick.

Q2 Ans :-

→ i) Weber.

Q3 Ans :-

→ iv) β-rays.

Q4 Ans :-

→ ii) $\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2}$

Q5 Ans :-

Internal Resistance of cell :- Internal resi-stance can be defined as the resistance provided by the electrolyte of a cell.
it is denoted by 'r', its unit is ohm.

Q. Ans :- Lorentz force :- Lorentz force is a force acting on a

charged particle in combined electric and magnetic field.

Lorentz force = $F_m + F_e$
$= qvB + qE$
$= [q(E + vB)]$

q ⇒ charge
E ⇒ intensity of electric
B = magnetic field
v = velocity of particle.

Q7 Ans ÷ Mass = 1gm = $\frac{1}{1000} = 10^{-3}$ Kg.

According to einstien mass energy equivalence ÷

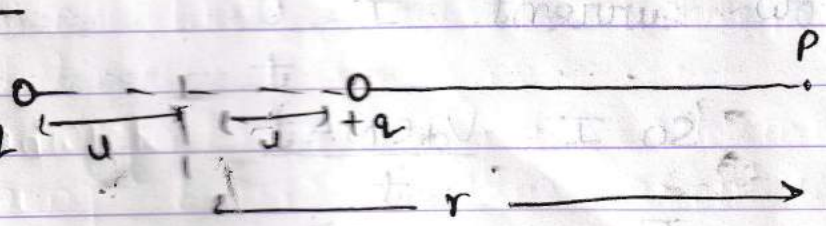
$E = mc^2$
$E = (10^{-3})(3 \times 10^8)^2$
$E = 10^{-3}(9 \times 10^{16})$
$[E = 9 \times 10^{13} \text{ J}]$

Q8 Ans ÷

Majority charge carrier in N-type ÷ electrons

Majority charge carrier in P-type ÷ holes.

Q9 Ans :-



Intensity of electric field on axial position of electric dipole :-

$$\left[E = \frac{1}{4\pi\varepsilon_0} \frac{2p}{r^3} \right]$$

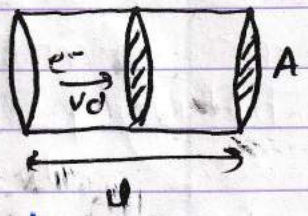
where,

$\frac{1}{4\pi\varepsilon_0}$ = constant = $9 \times 10^9\ Nm^2 C^{-2}$

p = dipole moment

r = distance of the point from centre of dipole.

Q10 Ans ⇒ Let a conductor have l length and A area of cross section. and e^- are moving with v_d velocity.



No. of electron passing through area of cross section A in t time :-

$$\Rightarrow v_d N A t$$

Charge on $1e^-$ = e

Now current $I = \frac{Q}{t}$

So $I = \frac{V_d e N A t}{t}$

$[I = V_d e N A]$

V_d = drift velocity of e⁻
e = charge on e^-
N = number of e^- pass in 1 second
A = Area of cross section

Q11 Ans :-

Effect of temperature on resistivity of metal :-

The resistivity of metal increases on increasing the temperature and decreases on decreasing the temperature.

$[R_T = R_0(1 + \alpha \Delta T)]$ $\left[R = \frac{\rho l}{A}\right]$

Effect of temperature on resistivity of semiconductor :-

The resistivity of semiconductor decr-eases on increasing the temperature decreasing temperature

Semiconductor behave as insulator at room temperature.

Q12 Ans :-

Number of turn = 100 (N)

Radius of coil = 10 c.m = $\frac{10}{100} = \frac{1}{10}$ m (r)

Current ⇒ 3.2 A

Magnetic field at centre of coil :-

$$B = \frac{N \mu_0 I}{2r}$$

$$= \frac{100 \times 4\pi \times 10^{-7} (3.2)}{2\left(\frac{1}{10}\right)}$$

$$\Rightarrow \frac{100 \times 4\pi \times 10^{-7} \times 3.2 \times 10}{2}$$

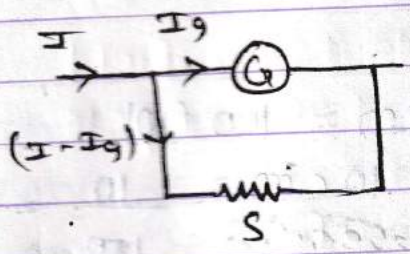
$$\Rightarrow 2.0096 \times 10^{-7} \text{ T}$$

$$\Rightarrow 2.0096 \times 10^{-3} \text{ T}.$$

Q13 Ans :-

Moving coil galvanometer is :-

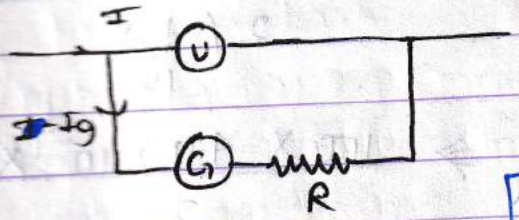
i) **Ammeter** :- Moving coil galvanometer can be converted to ammeter by connecting a small resistance called shunt parelled to it.



$(I_g)\,G = (I-I_g)\,S$

$\left[S = \frac{(I_g)\,G}{I-I_g}\right]$

ii) **Voltmeter** :- Moving coil galvanometer can be converted to voltmeter by connecting a high resistance ~~par~~ in series with galvanometer.



$V = (I_g)(G+R)$

$V = I_g(G+R)$

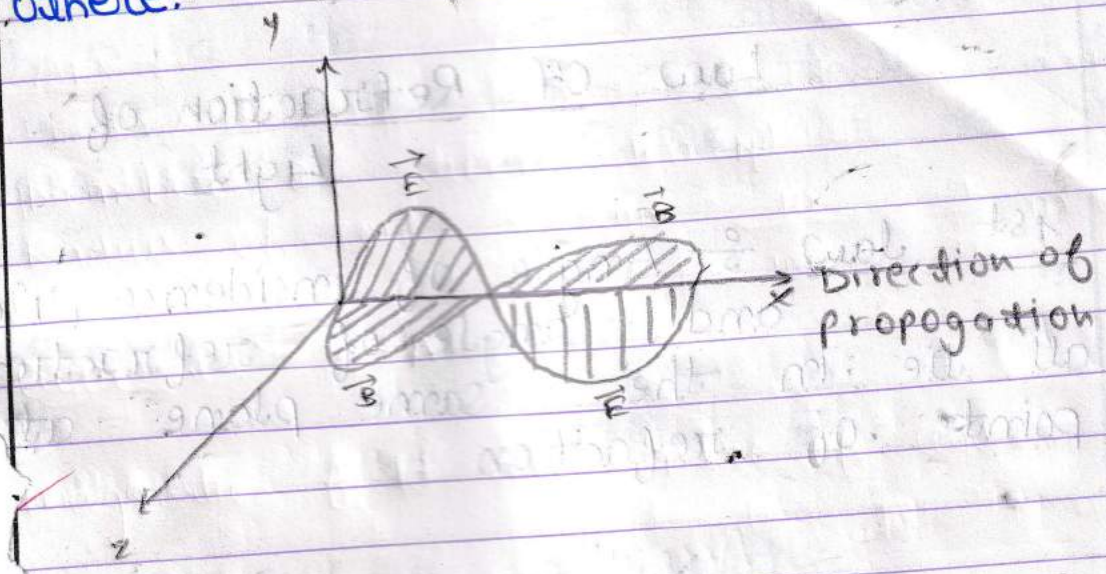
$\left[\frac{V}{I_g} - G = R\right]$

Q14 Ans :-

Transverse Nature of electromagnetic wave :-

Transverse nature of electromag-netic wave means :- In electromag

netic wave electric fied vector, magnetic field and direction of propogation of wave remain perpendicular to each othere.



Q 15 AW $\frac{0}{0}$

Focal length of convex lens = 20 c.m. (F_1)
Focal length of concave lens = -30 c.m (F_2)

By formula $\frac{1}{F} = \frac{1}{F_1} + \frac{1}{F_2}$

$$\frac{1}{F} = \frac{1}{20} - \frac{1}{30}$$

$$\frac{1}{F} = \frac{30 - 20}{600}$$

$$\frac{1}{f} = \frac{10}{600}$$

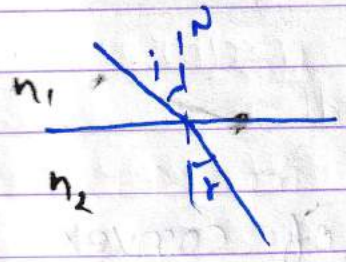
$$f = \frac{600}{10}$$

∴ focal length of combination will = +60 cm.

Q16 Ans :-

Law Of Refraction Of Light

1st law :- Angle of incidence, Normal and angle of refraction all lie in the same plane at point of refaction.



2nd law :- The ratio of sine of angle of incidence to sine of angle of refraction remain constant. This law is also called "Snell's law"

$$\frac{\sin i}{\sin r} = \text{Constant}$$

or $$\frac{\sin i}{\sin r} = \frac{n_2}{n_1}$$

Q17 Ans :-

Matter waves :- According to de-broglie every moving particle have a wave nature also. and the wave corresponding to these particle are called matter waves or de-broglie wave.

Relation :-

$$\lambda = \frac{h}{p} = \frac{h}{mv}$$

λ = de-broglie wavelength
p = momentum of particle = Mass x velocity
$= m \times v.$

Q18 Ans :-

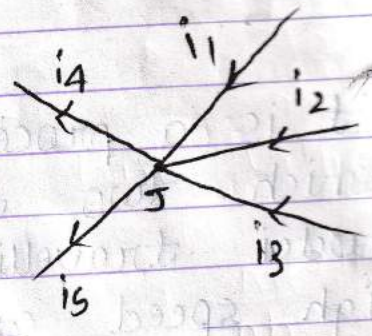
Nuclear fission	Nuclear fusion
• it is a proces in which heavy particle split into lighter Nuclei	• it is a process in which two lighter nuclei travelling with high speed combine to form heavy nuclei.
• Less energy is release	• enormous amount

• can be controlled ex :- $U^{235} + {}_0n^1 \rightarrow Ba + Kr + 3\,{}_0n^1$	• Can't be controlled till now. ex :- ${}_1H^1 + {}_1H^1 \rightarrow {}_2He^4$

Q19 Ans :-

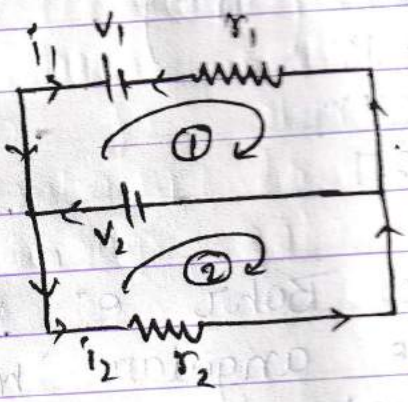
Kirchoff Laws :-

1st law :- According to kirchoff first law :- The algebric sum of current entering the junction is equal to the sum of current leaving the junction.
This law is based on conservation of charge it is also called "junction law"



$$i_1 + i_2 + i_3 = i_4 + i_5$$

2nd law :- According to Kirchoff second law the algebric sum of the voltage and emf around a closed circuit is zero. it is also called **loop law**.



In loop 1

~~$V_1 - i_1 r_1 = 0$~~

$-V_1 + i_1 r_1 + V_2 = 0$

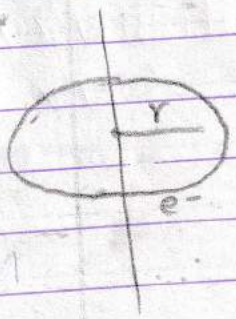
In loop 2 :-

$-V_2 + i_2 r_2 = 0$

m=2A

Q 20 Ans :-

Let an electron of charge e is revolving around nucleus in radius r with velocity v



So Area of path = πr^2

and current $I = \frac{Q}{t} = \frac{e}{t}$ —①

Now $s = \frac{d}{t}$, $t = \frac{d}{s}$

$$\left[t = \frac{2\pi r}{v} \right]$$

Put value of t in ①

$$I = \frac{ev}{2\pi r}$$

So dipole moment

$$m = IA$$

$$= \frac{ev}{2\pi r}\left(\pi r^2\right)$$

$$m = \frac{evr}{2}$$

Now acording to Bohr e^- revolve in orbital whose angular momentum is integral multiple of $\frac{nh}{2\pi}$.

Now angular momentum of e^- = mvr

$$J = m_e vr$$

Now $\frac{m}{J} = \frac{e}{2m_e}$ — (11) [m_e = mass of e^-]

Acording to Bohr.

$$J = \frac{nh}{2\pi}$$

Put value of J in (11)

$$\frac{m}{nh}\,2\pi = \frac{e}{2m_e}$$

$$\left[m = \frac{nhe}{\quad}\right]$$

if $n = 1$ then $m = \mu$ (Bohr magneton)

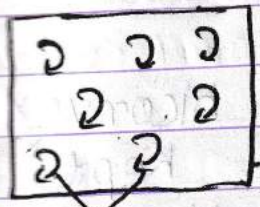
$$m = \frac{he}{4\pi me}$$

Putting all values
$[m = 3.4 \times 10^{-24}\ A\text{-}M^2]$

which is elementry magnetic moment of e⁻.

Q21 Ans ⇒

Eddy Current :- Eddy current are these current which are produces in the bulk of material placed in a variable magnetic field. these current oppose main current which produce losses.



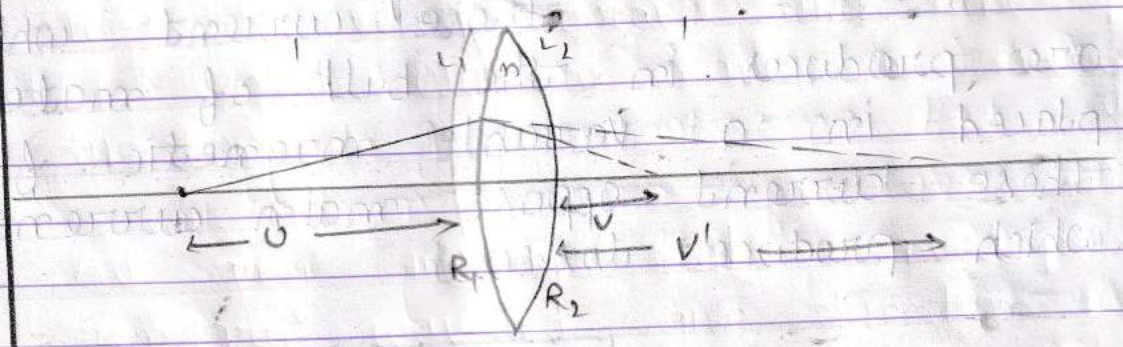
How they arise? :- Eddy current arise due to variable magnetic field along with the main current.

Use of eddy current :-

- To make galvanometer dead beat :-

Eddy currents are used to make galvanometer dead beat, frame of galvanometer over which coil is wound is made of aluminium so that eddy current produce in it and it will stop quickly.

Q 22 Ans :-



Let a ~~bi~~ biconvex lens of refractive index n is kept in air with R_1 and R_2 radii of curvature of lens L_1 and L_2 respectivity.

For the refraction at L_1 image is formed at V'

So $\frac{n}{v'} - \frac{1}{u} = \frac{n-1}{R_1}$ —①

For refraction at L_2 image of L_1 act as object

So $$\frac{1}{v} - \frac{n}{v'} = \frac{1-n}{R_2} \quad \text{— (I)}$$

Add (I) and (II)

$$\frac{1}{v} - \frac{n}{v'} + \frac{n}{v'} - \frac{1}{u} = \frac{n-1}{R_1} + \frac{1-n}{R_2}$$

$$\frac{1}{v} - \frac{1}{u} = \frac{n}{R_1} - \frac{1}{R_1} + \frac{1}{R_2} - \frac{n}{R_2}$$

$$\left[\frac{1}{v} - \frac{1}{u} = (n-1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)\right] \quad \text{— (I)}$$

Now by lens formula

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f} \quad \text{— (II)}$$

Put (II) in (I)

$$\left[\frac{1}{f} = (n-1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)\right]$$

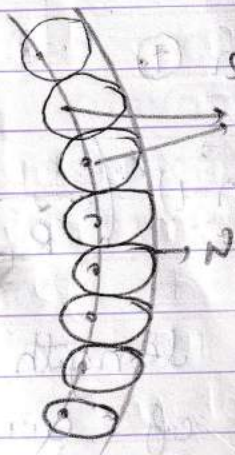
f = focal length of lens
R_1 = Radii of curvature of L_1
R_2 = Radii of curvature of L_2
n = Refractive index of medium of lens

Q2) 3 Ans :-

Huygen's principle of secondary wavelets

According to Huygen's principle of secondary wavelet :-

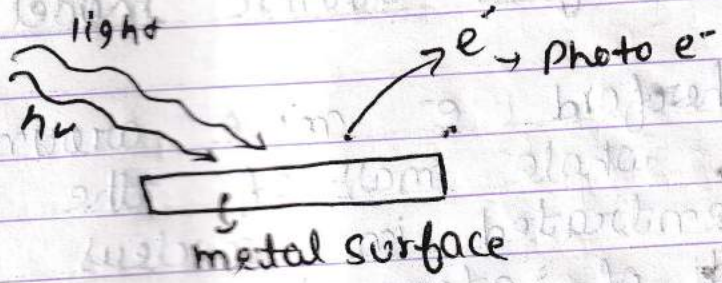
- Every particle situated on wavefront act as a new wave source from which new wave originate, these are called secondary wavelet.
- These wavelet travel with the speed of ~~light~~ original wave in every direction.
- At any instant the envelope of secondary wavelet give direction of new wavefront at that instant.



Q2 4 AW :-

Photoelectric effect :-

Photoelectric effect can be defined as phenomena of emission of photo electrons from metal surface under influence of light of specific wavelength.



Work function :- work function can be defined as the minimum amount of energy required to emmit photo electron from metal surface. it is different for different metal.

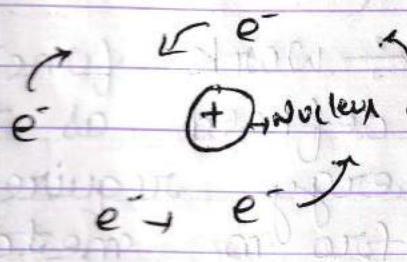
Threshold frequency :- Threshold fequency can be defined as the minimum frequency of incident light that is must required to emit photoelectrons from metal surface

$[\phi_w = h\nu_0]$

ϕ_w = work function
h = plank's constant
ν_0 = Threshold frequency

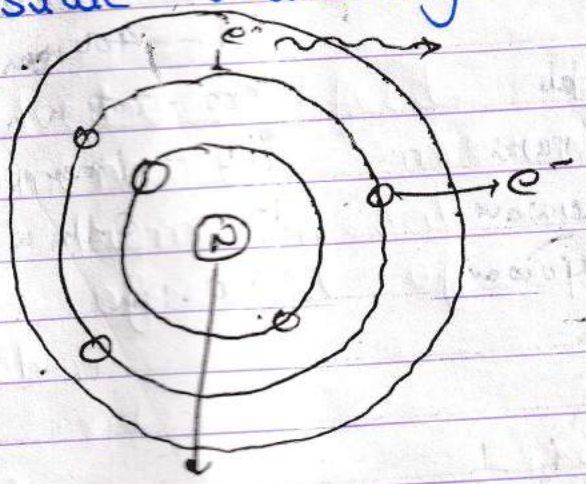
Q25 Ans :-

Rutherford atomic model :- according to Rutherford e^- move around nucleus. The whole mass of the atom is concentrated in nucleus and most part of atom is hollow



Bohr atomic model :- according to Bohr e^- revolve around nucleus in fix energy level whose angular momentum is integral multiple of $\frac{h}{2\pi}$. e^- while revolving around nucleus do not radiate energy. e^- can recieve a

energy equal to energy gap get excite and after 10^{-8} s get back to ground state releasing energy.

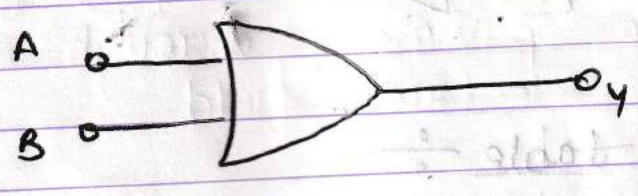


Diffrences :-

Rutherford model	Bohr model
e⁻ revolve anywhere around nucleus	• e⁻ revalve around only that energy level whose orbital angular momentum is integral multiple of $h/2\pi$
• Does not explain stability of atom	• explains stability of atom.
Can not explain	• could explain about atomic spectrum.

Q26 AM :-

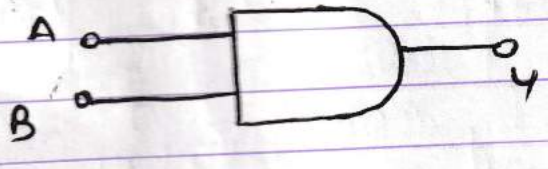
OR Gate



Truth table :-

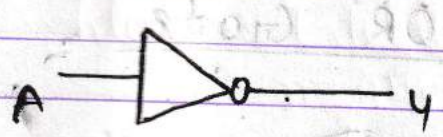
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

AND Gate :-



A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

÷ NOT GATE ÷

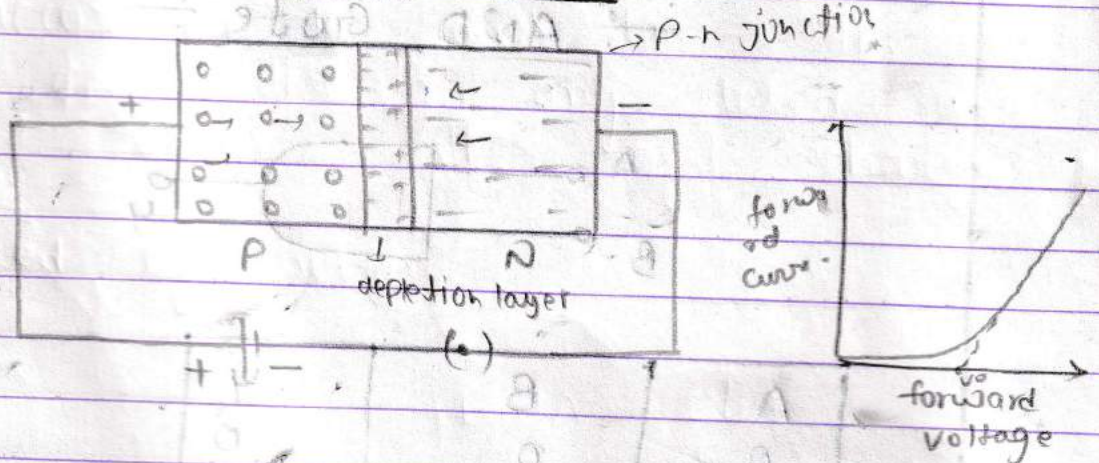


Truth table ÷

A	Y
0	1
1	0

Q27 AW ÷

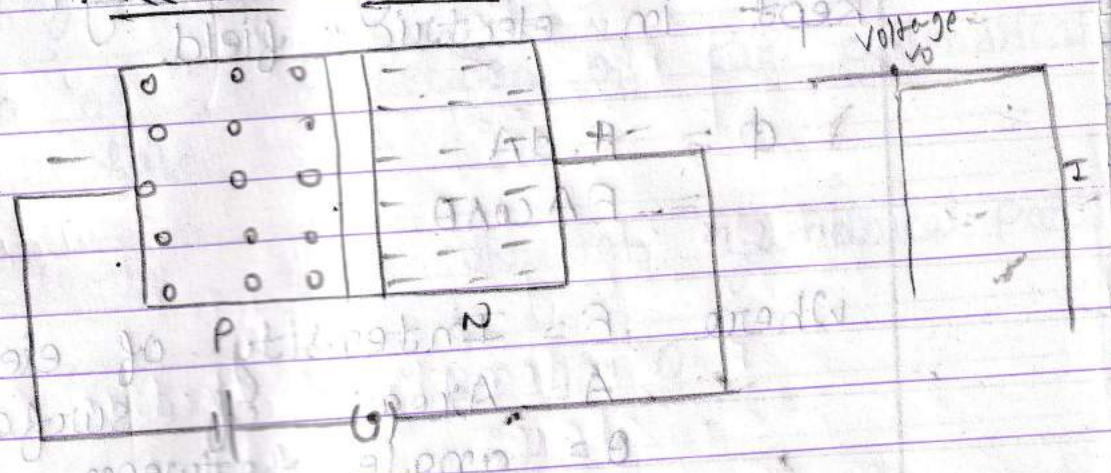
÷ Forward bias ÷



A p-n junction is said to be forward bias if p-part of the junction is connected to positive terminal and N part is connected to negative terminal p-N junction diode carry current in forward bias.

in forward bias current firstly increases slowly and after it overcome depletion layer voltage current increases rapidly.

Reverse - Bias :-



A p-n junction diode is said to be reverse bias if the p- part of junction is connected to positive part and N-part of junction is connected to negative terminal.

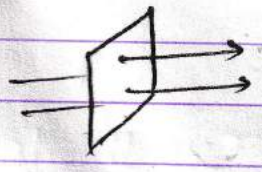
A- p-n junction diode do not conduct current in reverse bias.

in start there is a small charge due to minority charge carrier but after V_0 (break-down voltage) current increases abruptly this condition is called "Avalanche break down"

Q2 & Ans :-

Electric flux :- Electric flux is a measure of electric li of force passing through the surface kept in electric field.

$$\Phi = E.dA$$
$$= EA\cos\theta.$$



Where E = Intensity of electric field
A = Area of surface
θ = angle between E and A.

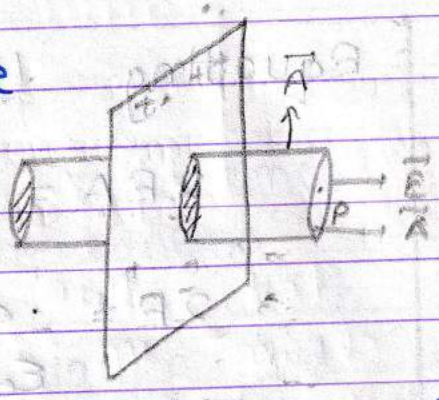
Gauss law :-

According to gauss law :- The electric flux ϕ_E through any closed surface is $\frac{1}{\varepsilon_0}$ times the net charge q enclosed by surface.

$$\Phi = \int E.dA = \frac{q}{\varepsilon_0}$$

electric field intensity due to uniformly charged infinite plane sheet :-

Let we have to calculate electric field intensity at point P due to infinity plane sheet of charge.



Let area of cross section of our cylindrical gaussian surface is A

Now Electric flux through cylindrical part

$$\Rightarrow 2\int E \cdot dA = \int 2E.A\cos 90 = \underline{0}$$

And Electric flux through circular part of cylinder $\Rightarrow$

$$\phi = 2\int E.dA = 2E\int dA = 2EA \quad \text{---(i)}$$

Let the charge density of plate be σ

$$\sigma = \frac{q}{A}$$

$$q = \sigma A$$

Now According to gauss law :-

$$\phi = \frac{q}{\varepsilon_0} = \frac{\sigma A}{\varepsilon_0} \quad \text{---(ii)}$$

Equating (I) and (II)

$$2EA = \frac{\sigma A}{\varepsilon_0}$$

$$2E = \frac{\sigma}{\varepsilon_0}$$

$$\left[E = \frac{\sigma}{2\varepsilon_0} \right]$$

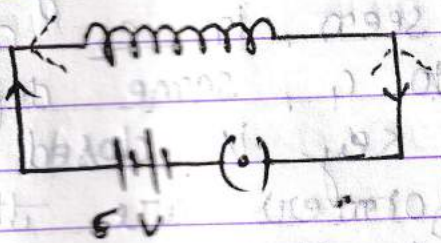
where :—

E = intensity of electric field
σ = charge density
ε_0 = permittivity of free space

29 AW :-

Self inductance :- Self inductance is a phenomena of electromagnetic induction in which on changing the current in a coil an opposing induced emf is set in the same coil.

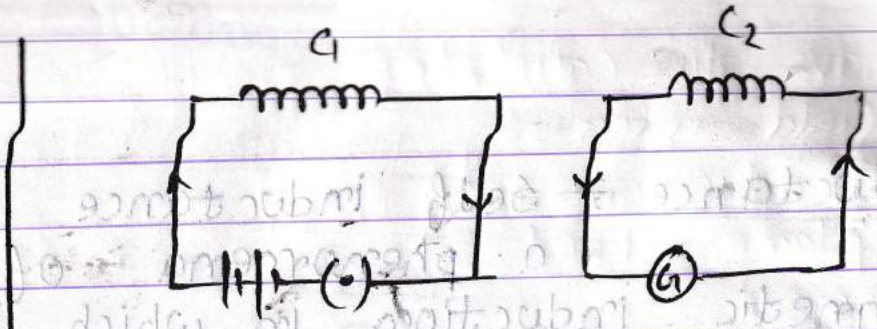
ex :-



Let in a circuit, a inductor coil is connected in a circuit. when the switch is ~~op~~ closed then the emf in circuit increases gradually from 0 to I, due to this an opposing emf is induced in the same coil which is shown by dotted arrow. ex :- choke coil.

Mutual induction :- Mutual induction is a phenomena of electromagnetic induction in which on changing the current in the coil an opposing emf is induced in the coil placed near to it.

ex →



Let two circuits are arranged as shown in figure when switch is closed in C_1 current Rises from 0 to I and deflection in galvanometer of C_2 can be seen, in C_2 direction of emf is opposite to C_1, same deflection is observed when the key is closed.

Tranformers are the examples of mutual induction.

Numerical :-

initial current = 5 A.

final current = 0 A.

time = 0.1 s.

emf induced = 200 V.

L = ?

$$E = -L \frac{dI}{dt}$$

$$E = -L \frac{\Delta I}{\Delta t}$$

$$200 = -L \frac{(0-5)}{0.1}$$

$$(200)(0.1) = -L(-5)$$

$(200)(0.1) = -L(-5)$

$20 = 5L$

$[L = 4 \text{ Henry}]$ Ans

So coefficient of self induction of coil is 4 Henry.

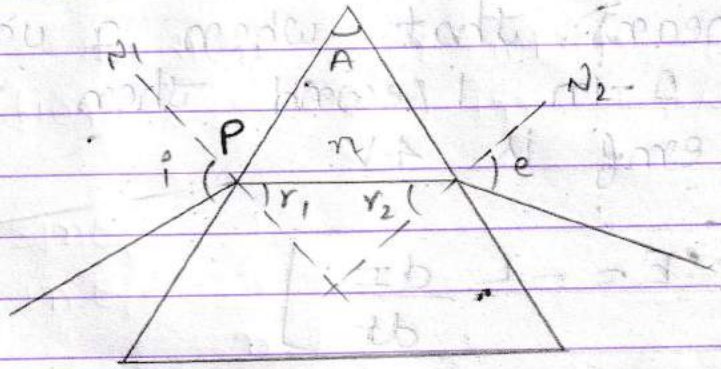
it means that when a unit current falls to 0. in 1 second then the self induced emf is 4V.

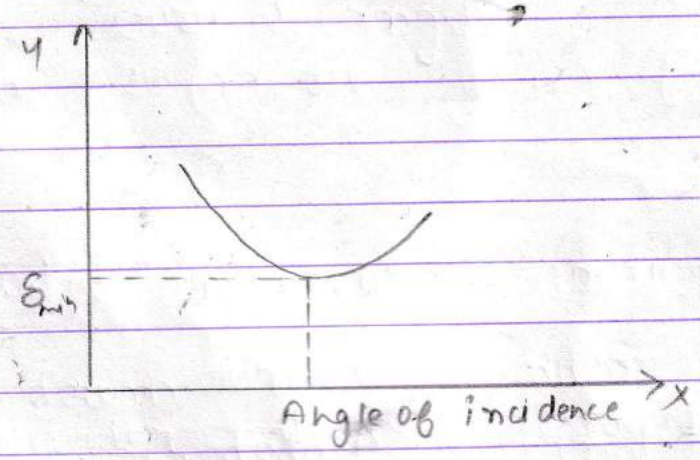
$$\left[E = -L \frac{dI}{dt} \right]$$

Q 30 Ans :-

(a) Ans :-

(b) Graph between angle of incidence and minimum deviation :-





The graph between angle of deviation and angle of incidence can be made by taking various value of I and noting angle of deviation.

It can be seen from the graph that for only one angle of incidence

there is a minimum deviation.
Thus deviation is minimum for only and only one angle of incidence.

Condition :-

Angle of deviation is minimum at $i = e$ and $r_1 = r_2$
in this situation the refracted light beam is ~~parellel~~ parelled to base.

In state of minimum deviation :-

$$\delta = i + e - A$$
$$\delta = 2i - A \quad (\text{As } i = e)$$
$$\left[i = \frac{\delta + A}{2} \right]$$

$$A = r_1 + r_2$$
$$A = 2r \quad [\text{As } r_1 = r_2 = r]$$
$$\left[r = \frac{A}{2} \right]$$

Now apply snell law at P

$$\frac{\sin i}{\sin r} = n$$
$$n = \frac{\sin i}{\sin r}$$

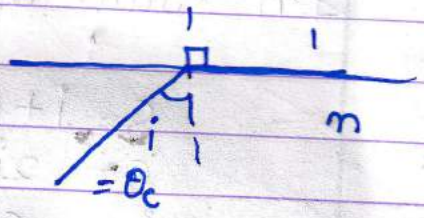
So $$\left[n = \frac{\sin\left(\frac{A+\delta m}{2}\right)}{\sin \frac{A}{2}} \right]$$

where n is refractive index of medium of glass.

Ans :-

Critical angle :- Critical angle is the angle of incidence in denser medium for which angle of refraction is 90° in denser medium

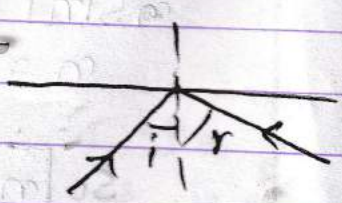
$$n \sin\theta_c = 1$$
$$\left[\sin\theta_c = \frac{1}{n} \right]$$



θ_c = critical angle
n = refractive index of denser medium

Total internal refraction :- When a light ray incident from denser medium at an angle greater then the critical angle it suffer total internal reflection and reflected back into denser medium.

Condition :-



- Light must go from denser to rarer medium.

- angle of incidence in denser medium must be greater then critical angle.