

Name : Priyanka Ganapati Soreganvkar

VUCMS NO : U15KM2350367

Subject : Physics

class : II sem

Div : B

27
30

No I

d) Magnetization is a process of converting non-magnetic material to magnetic material.

a) Coulomb's law

Statement :- The force of attraction or repulsion between two point charges is directly proportional to the product of magnitude of two point charges and inversely proportional to the square of the distance between them.

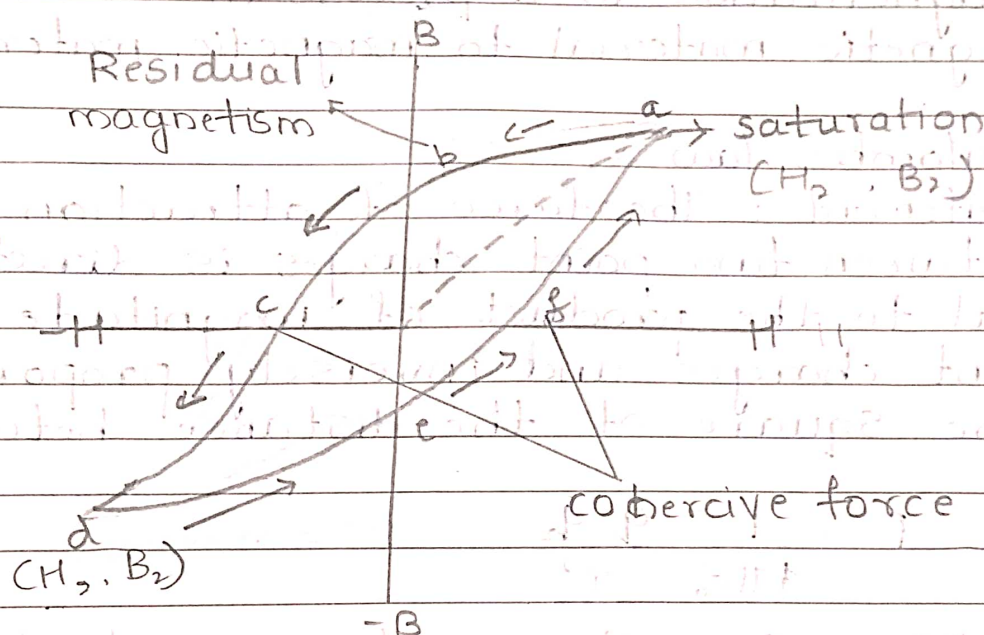
$$F = \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2}$$

where q_1 & q_2 are two point charges

r is the distance between the two point charges

Q. No. II

c) B-H curve - B-H curve is a curve showing the variation of magnetic flux density B and magnetic field H . It is the characteristic of magnetic properties of material, element or an alloy. It talks about how the material responds to the external magnetic field.



Importance of B-H curve

→ Since Fe is extensively magnetized over a great extent and by the means of weaker field than Co, Ni. Pure Fe is mechanically soft material and rusts too easily but the magnetic properties of Fe varied very considerably. Hysteresis curve afforded them to select suitable material for industrial purpose.

Types of magnetic material with example

i) Diamagnetic material

Example: Copper, gold, quartz

ii) Paramagnetic material

Example: Platinum, aluminium, chromium

iii) Ferromagnetic material

Example: cobalt, Nickel

iv) Ferrimagnetic material

Example: Nickel, Fe_2O_3

v) Anti-ferromagnetic material

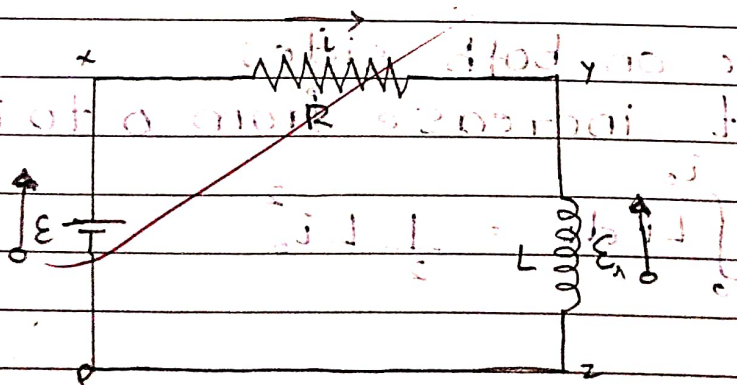
Example: XFe_2O_3 where $\text{X} = \text{Mn}, \text{Mg}$

Q. No III

c) Expression for the energy stored in a magnetic field

Suppose a current in the circuit is increasing, self inductance will try to decrease the current. Therefore there must be a work done to overcome induced emf driven by the current circuit.

To derive the quantitative expression for energy stored in magnetic field there is source of emf $\mathcal{E}$, Resistance R , inductance L . For



U15KM23S0367

$\frac{1}{2} Li_0^2$ is the magnetic energy stored in the inductance L with the current i_0 .

d) Differential forms of Maxwell's equation

i) $\vec{\nabla} \cdot \vec{D} = \rho$

where D is displacement current and ρ is the free charge density

integrating by the volume orbitary

$$\int_V \vec{\nabla} \cdot \vec{D} dv = \int_V \rho dv$$

From Gauss - divergence theorem

$$\int_V \vec{D} \cdot d\vec{s} = \int_V \rho dv$$

or $\int_V \vec{D} \cdot d\vec{s} = q$

ii) $\vec{\nabla} \cdot \vec{E} = 0$

integrating by the volume orbitary

$$\int_V \vec{\nabla} \cdot \vec{E} dv = 0$$

From Gauss divergence theorem

$$\int_V \vec{E} \cdot d\vec{s} = 0$$

iii) $\vec{\nabla} \times \vec{E} = - \frac{\partial \vec{B}}{\partial t}$

integrating equation by the surface boundary

$$\int_S (\vec{\nabla} \times \vec{E}) \cdot d\vec{s} = - \int_S \frac{\partial \vec{B}}{\partial t} \cdot d\vec{s}$$

By Stoke's theorem of LHS

$$\int_S \vec{E} \cdot d\vec{s} = - \int_S \frac{\partial \vec{B}}{\partial t} \cdot d\vec{s}$$

S is the closed surface

$$(iv) \vec{\nabla} \times \vec{B} = \mu_0 \left(\vec{J} + \frac{\partial \vec{D}}{\partial t} \right)$$

Integrating by surface boundary

$$\int_S (\vec{\nabla} \times \vec{B}) \cdot d\vec{s} = \mu_0 \int_S \left(\vec{J} + \frac{\partial \vec{D}}{\partial t} \right) \cdot d\vec{s}$$

$\vec{J}$ is the conduction current



B. L. D. E. Association's

S. B. ARTS & K. C. P. SCIENCE COLLEGE, VIJAYAPUR

II

INTERNAL TEST 2023 -2024

Name / ಹೆಸರು: Priyanka Soreganavar Roll No./ಸ್ಥಳಾಂಕ: _____ Date / ದಿನಾಂಕ: _____ -20

Subject/ವಿಷಯ: Physics Semester/ಸೆಮಿಸ್ಟರ್: II Exam Seat No / ಪರೀಕ್ಷೆ ಸ್ಥಳಾಂಕ: U15KM23S036

Invigilator's Signature / ಕೋರದಿ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ Signature of Evaluator / ಪರೀಕ್ಷಕರ ಸಹಿ Marks obtained / ಪಡೆದ ಅಂಕಗಳು

12/15

Q. No. I

a) Ampere's circuital law

Statement - The line integral of magnetic field in closed loop is equal to the μ_0 times current flowing through the coil

expression for Ampere's circuital law

$$\oint B \cdot dL = \mu_0 I$$

b) Properties of magnetic field lines

- They form closed loop
- They do not intersect each other
- They have two poles
- Monopoles does not exist

c) Kirchhoff's law - The algebraic sum of current meeting at a point is always zero

d) Ballistic Galvanometer is a device used to measure

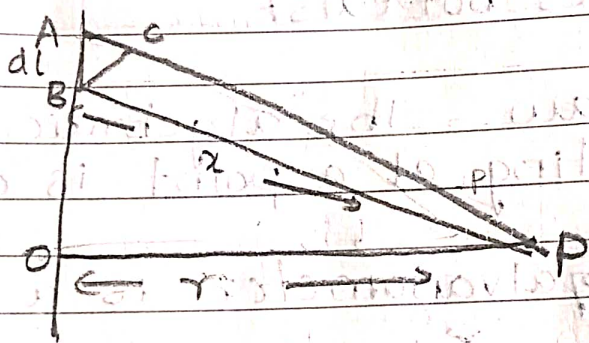
Q. NO II

a) Biot Savart's law

Statement - The magnetic field at P due to current element is eq^l directly proportional to current flowing through the coil & length of current element & the angle between the point P and current element and inverse proportional to the distance between the point P at magnetic field is measured from the conductor.

$$dB = \frac{\mu_0}{4\pi} \frac{Idl \sin\theta}{r^2}$$

a) At a point due to long straight conductor carrying current



consider XY be the long straight conductor and P be the point distance r from the conductor AB be the length of current element.

from Biot Savart's law

$$dB = \left(\frac{\mu_0}{4\pi} \right) \frac{Idl \sin\theta}{r^2} \quad \text{--- (1)}$$

draw $AC \perp BP$

In triangle ABC

$$\sin \theta = \frac{AC}{AB} \quad \text{--- (1)}$$

$$AC = AB \sin \theta$$

$$AC = dl \sin \theta$$

$$\text{Arc } ac = r d\phi$$

$$dl \sin \theta = r d\phi \quad \text{--- (2)}$$

In $\triangle AOP$

$$\cos \phi = \frac{AP}{AO}$$

$$\cos \phi = \frac{OP}{AP}$$

$$\cos \phi = \frac{r}{R}$$

$$R = \frac{r}{\cos \phi} \quad \text{--- (3)}$$

Put eqn (2) & (3) in eqn (1)

$$dB = \frac{\mu_0}{4\pi} \frac{I r d\phi}{r^2}$$

$$dB = \frac{\mu_0}{4\pi} \frac{I d\phi \cos \phi}{r}$$

Integrate on both sides

$$\int dB = \frac{\mu_0}{4\pi} \frac{I}{r} \int d\phi \cos \phi$$

$$B = \frac{\mu_0}{4\pi} \frac{I}{r} \int_{-\phi_1}^{+\phi_2} \cos \phi d\phi$$

$$dB = \frac{\mu_0}{4\pi} \frac{I d\phi \cos \phi}{r}$$

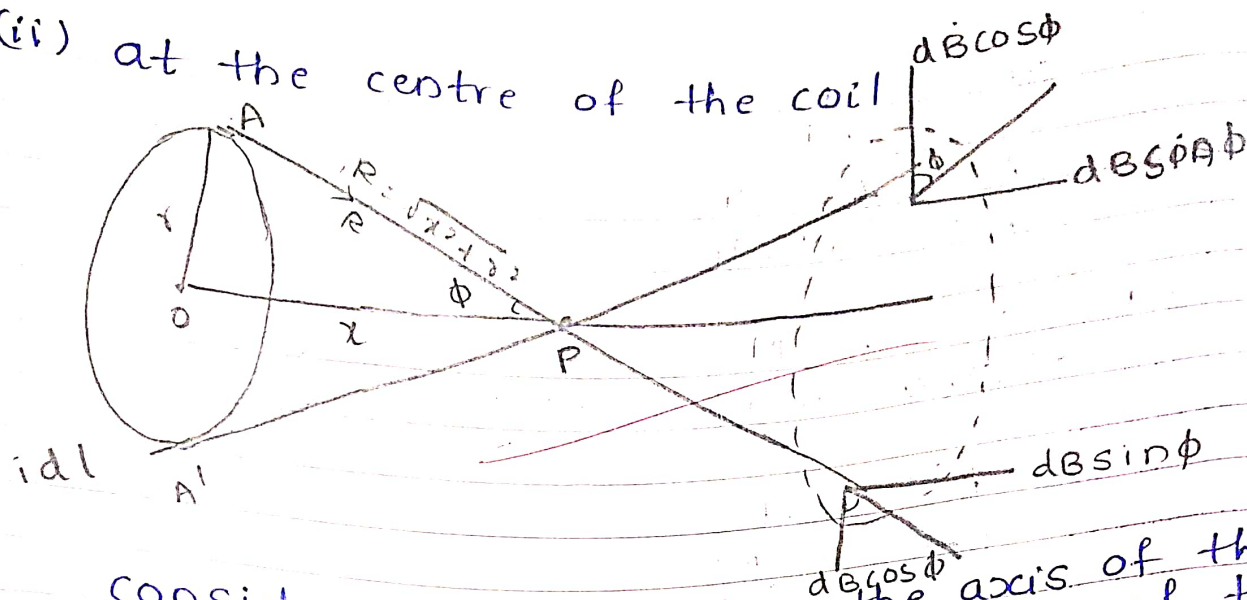
$$dB = \frac{\mu_0}{4\pi} \frac{I d\phi \cos \phi}{r}$$

$$\int dB = \frac{\mu_0}{4\pi} \frac{I}{r} \int_{-\phi_1}^{+\phi_2} \cos \phi d\phi$$

$$B = \frac{\mu_0}{4\pi} \frac{I}{r} \left[\sin \phi \right]_{-\phi_1}^{+\phi_2}$$

$$B = \frac{\mu_0}{4\pi} \frac{I}{r} \left[\sin \phi_2 + \sin \phi_1 \right]$$

(ii) at the centre of the coil



consider point p along the axis of the circular coil r is the radius of the coil, x is the distance between point p

$$dB = \frac{\mu_0}{4\pi} \frac{Idl \sin \theta}{R^2} \quad [\theta = 90^\circ]$$

$dB \cos \phi$ along py and $dB \cos \phi$ along py' are equal & opposite they cancel each other.
The total magnetic field at P

$$B = \int dB \sin \phi$$

$$B = \frac{\mu_0}{4\pi} \frac{I}{R^2} \int_0^{2\pi} dl \sin \phi$$

Since

$$B = \frac{\mu_0}{4\pi} \frac{I}{R^2} [2\pi]$$

$$B = \frac{\mu_0}{4\pi} \frac{I}{R^2} 2\pi r$$

$$B = \frac{\mu_0 I r}{2 R^2}$$

$$B = \frac{\mu_0 I r}{2 (x^2 + r^2)^{3/2}}$$

for N number of turns

$$B = \frac{\mu_0 I r N}{2 (x^2 + r^2)^{3/2}}$$

b) Given:

$$N = 500$$

$$r = 0.05$$

$$I = 7 \text{ A}$$

i) $x = 0.12 \text{ m}$

$$B = \frac{\mu_0 N I r}{(x^2 + r^2)^{3/2}}$$

$$B = \frac{4\pi \times 10^{-7} \times 500 \times 7 \times 0.05}{((0.05)^2 + (0.12)^2)^{3/2}}$$

$$B = \frac{4 \times 3.142 \times 500 \times 7 \times 0.05 \times 10^{-7}}{(0.0025 + 0.144)^{3/2}}$$

$$B = \frac{2189.4 \times 10^{-7}}{(0.1465)^{3/2}}$$

$$B =$$

ii) At the centre of the coil

$$B = \frac{\mu_0 N I r}{2r^3}$$

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

$$B = \frac{4 \times 3.142 \times 500 \times 7}{2 \times (0.05)^2}$$

$$B = \frac{43988}{2 \times 0.0025}$$

$$B =$$

Q. No III

c) consider a rectangular copper coil placed in an uniform magnetic field

l be the length of the coil, b be the breadth of the coil. $A = l \times b$

B be the magnetic field and i be the current flowing through the coil

Torque acting on the coil

$$\tau = m B \sin \theta$$

$$\tau = i N A B \quad i = \frac{dq}{dt}$$

$$\tau = N A B \frac{dq}{dt}$$

$$\tau = N A B \theta$$

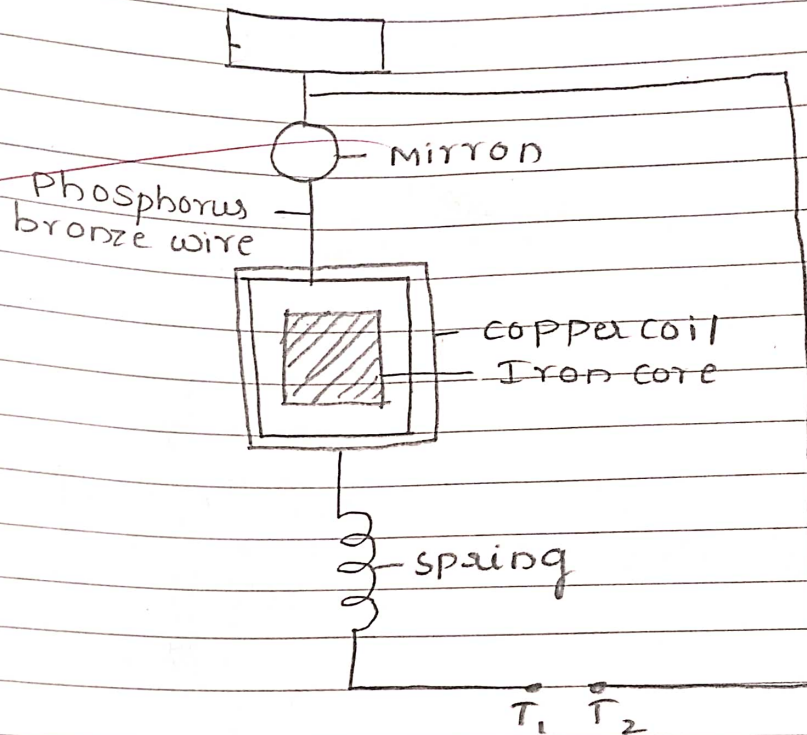
I be the moment of inertia and ω be the angular velocity

$$\text{Torque} = \frac{1}{2} \omega^2$$

$$\text{Kinetic energy} = \frac{1}{2} I \omega^2$$

$$\omega^2 = I \omega^2$$

d) Ballistic Galvanometer
 Principle : Torque acting on a coil placed in an uniform magnetic field, it starts rotating from its rest position



Construction

i) Ballistic Galvanometer coil is

Construction

- i) Copper coil is placed within the Ballistic Galvanometer in an uniform magnetic field
- ii) Coil The lower part of the coil is provided by the spring
- iii) The coil is provided with a mirror to avoid parallax errors
- iv) Iron core is suspended by copper coil



B. L. D. E. Association's

S. B. ARTS & K. C. P. SCIENCE COLLEGE, VIJAYAPUR

First - INTERNAL TEST 2023 -2024

Name / ಹೆಸರು : Prem. Bagalkot

Roll No./ಸ್ಥಳಾಂಕ : 217 Date /ದಿನಾಂಕ : 09-01-2024

Subject/ವಿಷಯ : Physics

Semester/ಸೆಮಿಸ್ಟರ್ : III Exam Seat No / ಪರೀಕ್ಷೆ ಸ್ಥಳಾಂಕ : WISJUG250058

Invigilator's Signature / ಕೊಠಡಿ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ Signature of Evaluator / ಪರೀಕ್ಷಕರ ಸಹಿ Marks obtained/ ಪಡೆದ ಅಂಕಗಳು

15 / 15

10/10

Q. NO. I

b) Refrigeration : It refers to process of conversion of cold body into hot body.

Co-efficient of performance : It is defined as the ratio of heat transformed from cold body to hot body to the room temperature.
$$Cof = \frac{Q_{cold}}{W}$$

c) Forbidden energy gap : The actual distance between valence band and conduction band.
eg: * Silicon energy gap is 0.3 eV at room temperature
* Germanium energy gap is 0.7 eV at room temperature

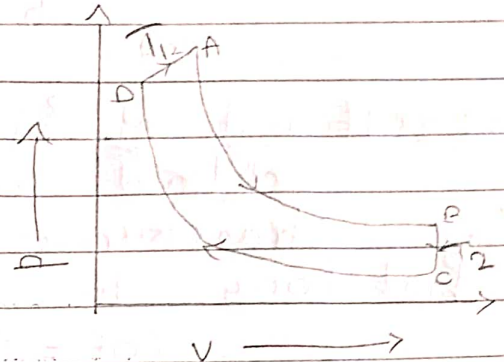
a) System : System is a state of matter enclosed by boundary
ex: class room

Surrounding : The area excluding the system
ex: playground

Q. NO. II

a) Thermodynamic entropy diagram:
The potential energy of the substance is plotted along with the y-axis is said to be thermodynamic entropy diagram (T.S. Diagram)

Let us consider a carnot engine which is having 2 isotherms - ad atoms AB and CD as shown in the fig (I).



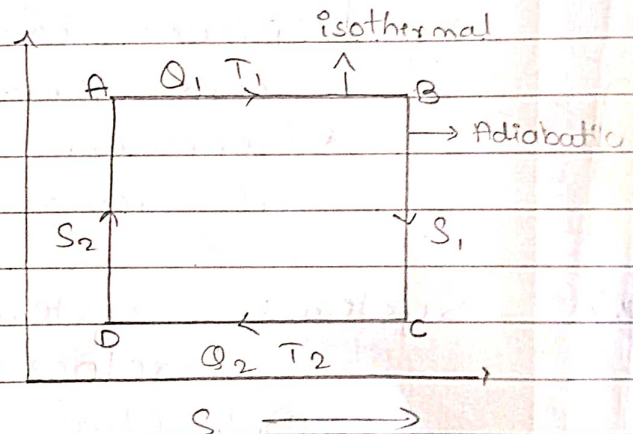
→ The two isothermal AB and CD are at constant temperature T_1 & T_2 , respectively.

Consider T.S diagram.

Let S_1 and S_2 be entropy along BC and AD respectively.

where

$S_1 \rightarrow$ change in entropy at point A



$S_2 \rightarrow$ Entropy ~~ent~~working substance at point B.

$S_1 \rightarrow$ Entropy working substance at point A.

$Q_1 \rightarrow$ Heat absorbed at temperature T_1 .

$Q_2 \rightarrow$ Heat absorbed at temperature T_2 .

→ It is going from A to B at isothermal region, the gain in entropy is given by,
 $S_2 - S_1 = \frac{Q_1}{T_1} \longrightarrow \textcircled{1}$

→ It is going from B to C at adiabatic region / process, there is no change in entropy, Entropy should be zero.

→ It is going from C to D at isothermal region, the rejection of entropy is given by,
 $S_2 - S_1 = \frac{Q_2}{T_2} \longrightarrow \textcircled{2}$

→ It is going from D to A at adiabatic region, there is no change in entropy, Entropy should be zero

From eq $\textcircled{1}$ & $\textcircled{2}$.

$$S_2 - S_1 = \frac{Q_1}{T_1}$$

$$\boxed{Q_1 = T_1 (S_2 - S_1)}$$

$$S_2 - S_1 = \frac{Q_2}{T_2}$$

$$\boxed{Q_2 = T_2 (S_2 - S_1)}$$

then

$$\boxed{Q_2 - Q_1 = (T_2 - T_1) (S_2 - S_1)}$$

where,

$Q_2 - Q_1 =$ change in entropy.

$(T_2 - T_1) (S_2 - S_1) =$ area on T.s diagram

or Given,

$$\begin{aligned}\text{Mass} &= 5 \text{ Kg} \\ &= 5000 \text{ g}\end{aligned}$$

$$\begin{aligned}\text{Temperature} &= 100^\circ\text{C} \\ &= 100 + 273 \\ &= 373 \text{ K}\end{aligned}$$

$$\text{Latent heat} = 540 \text{ cal/gram}$$

then,

$$\begin{aligned}dQ &= \text{Mass} \times \text{Latent heat} \\ &= 5000 \times 540 \\ &= 2700000 \text{ cal//}\end{aligned}$$

now,

$$ds = \frac{dQ}{T}$$

$$= \frac{2700000}{373}$$

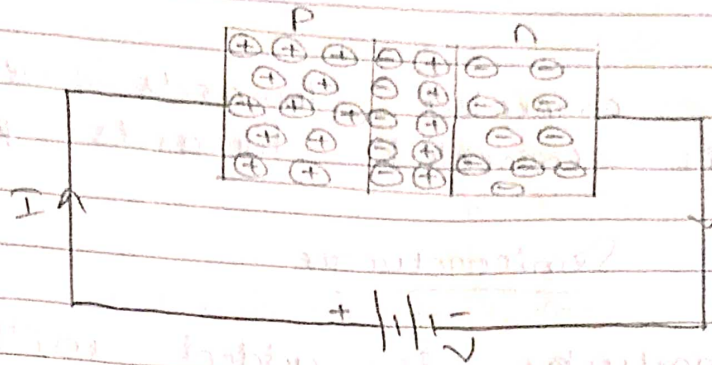
$$= 7238.60 \text{ cal/K//}$$

$$= 7.2386 \times 10^3 \text{ cal/K//}$$

Q. NO III

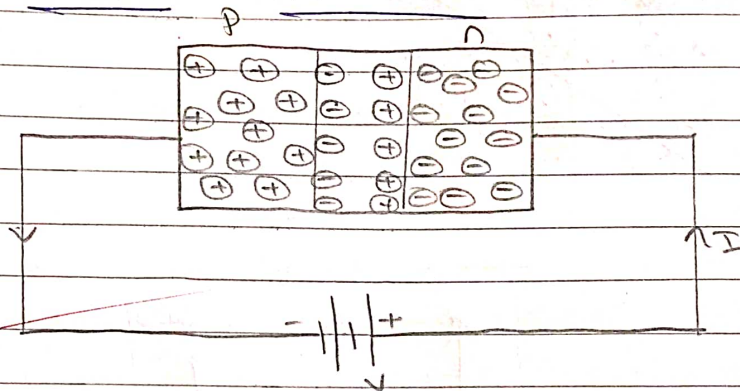
or Forward biased Characteristic

- * For forward bias connection p-type is used to positive terminal and n-type is used to negative terminal.
- * An p-type semiconductor positive terminal is added to battery.
- * An n-type semiconductor negative terminal is added to battery.
- * During forward bias diode D_1 is forward and D_2 is reverse.
- * During reverse bias diode D_2 is reverse.



- * P-type is connected towards positive
- * n-type is connected towards negative
- * When P-n type is joined electrons from n-type starts following towards p-type.
- * Same thing happens along another side and they form depletion layer.

Reverse biased characters

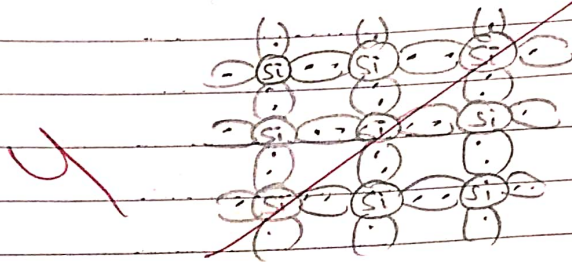


- * For reverse bias connection p-type is used to negative terminal & n-type is used to positive terminal.
- * In p-type semiconductor negative terminal is added to battery.
- * In n-type semiconductor positive terminal is added to battery.
- * During reversible bias D_1 is negative ~~or~~ reverse
- * During reverse bias D_2 is forward.
- * P-n type is joined electrons starts following from p to n type
- * Same thing will happen along another

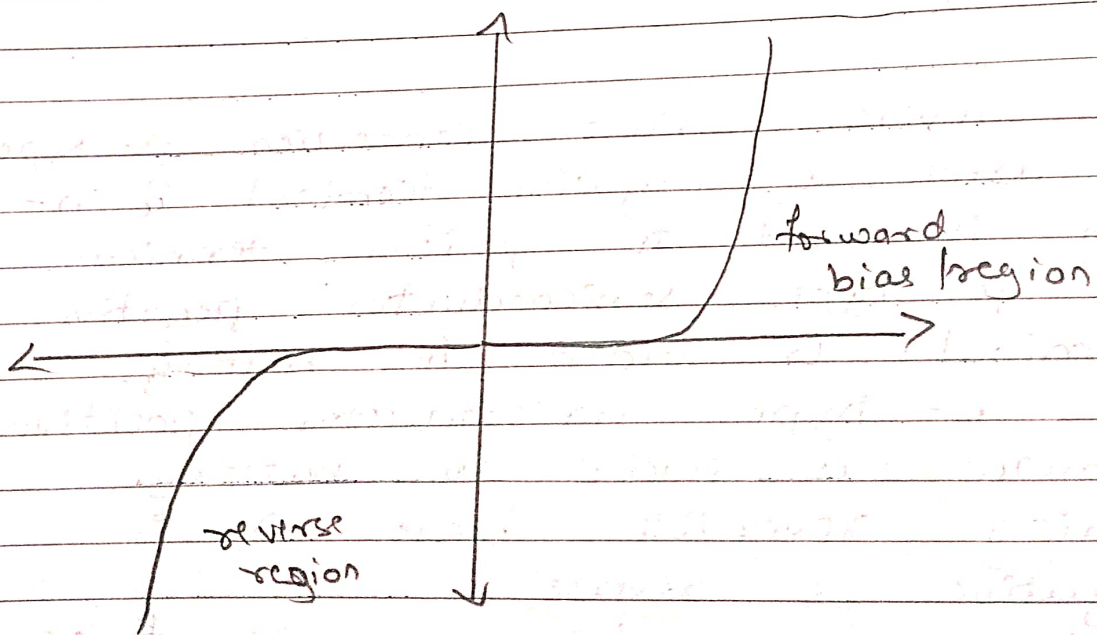
- Side.
- * P-type is connected towards negative
 - * n-type is connected towards positive

b) Intrinsic Semiconductor

- * A semiconductor is added with pure form is called intrinsic semiconductor.
- * These are in pure form
- * Conductivity is less than extrinsic semiconductor.
- * There only pure forms



q)





B. L. D. E. Association's

S. B. ARTS & K. C. P. SCIENCE COLLEGE, VIJAYAPUR

IInd INTERNAL TEST 2023 -2024

Name / ಹೆಸರು: MADHUMATI KALAGODNI Roll No./ಸ್ಥಳಾಂಕ: Date / ದಿನಾಂಕ: 06-08-2024

Subject/ವಿಷಯ: PHYSICS Semester/ಸೆಮಿಸ್ಟರ್: IVth Exam Seat No / ಪರೀಕ್ಷೆ ಸ್ಥಳಾಂಕ: 115K11250024

Invigilator's Signature / ಕೊಠಡಿ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ Signature of Evaluator / ಪರೀಕ್ಷಕರ ಸಹಿ Marks obtained / ಪಡೆದ ಅಂಕಗಳು

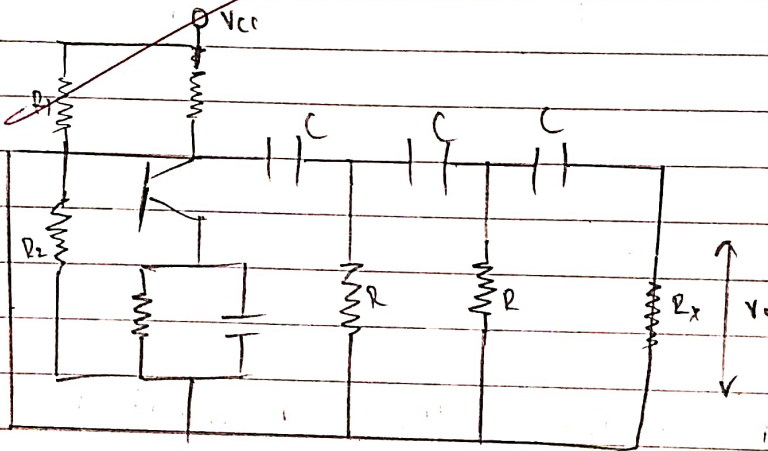
10/10

30/30

III

- c) → An oscillator is called phase shifting oscillator where many phase shifts are occurring.

Principle: → A phase shifting oscillator uses RC circuit to produce wave signal output voltage of $V = E \sin \omega t$ of certain frequency $f = \frac{1}{\omega RC} = \frac{1}{2\pi f RC}$



The input voltage V_0 leads output voltage V_0 by an angle ϕ . Then

$$\tan \phi =$$

Here RC circuit leads and adjusting R & C values the angle ϕ sets as 60° .

Each RC section produces 60° phase shift. then total phase shift is 180° .

Construction or working :

phase shifting oscillator consists of three sections of RC pairs are connected series with common emitter transistor. which produces phase shift also. applied the voltage. and produces output voltage which leads input voltage at angle ϕ .

Each RC circuit produces phase shift 60° . so, during three section of RC produces total 180° phase shift. we have use common emitter transistor which also produces 180° phase shift also.

Then the circuit consists a 360° phase shift. so there is no change in output voltage.

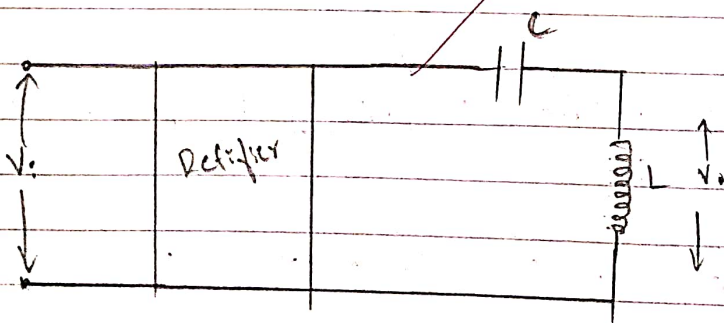
a)

LC filter

Name indicates that it consists of Inductor and Capacitor filter combinations

L - Inductor filter.

C - Capacitor filter.



LC filter consists of Inductor and Capacitor filters are connected to Rectifier. Capacitor is series and inductor is parallel with rectifier.

A handwritten lowercase letter 'y' on lined paper. The letter is formed with a single stroke, starting from the top line, curving down to the middle line, and then extending below the bottom line.

A handwritten lowercase letter 'y' on lined paper. The letter is formed with a single stroke, starting from the top line, curving down to the middle line, and then extending below the bottom line.

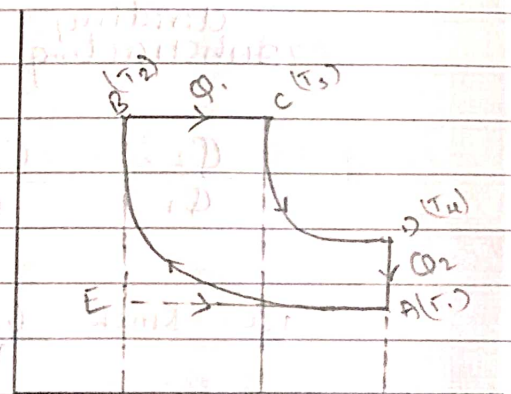
2

The Conditions for diesel engine

- * Working substance must be air which behave like perfect gas.
 - * There is no friction in the cycle.
- This is called diesel engine.

Considering Carnot cycle EABCD,

E to A represents intake of air & oil mixture into cycle or atmospheric pressure then the volume change from V_2 to V_1 .



- call. then volume change from V_1 to V_2 at ^{change in} temperature T_1 to T_2 .

B to C represents spread oil through Carnot cells
oil burnt immediately. at pressure remains constant.
volume change V_2 to V_3 occur at change of temperature T_2 to

C to D represents the air expands adiabatically
Volume change from V_3 to V_1 and temperature
 T_3 to T_4 .

D to A, Here at point D, reached the
exhaust, then the D to A represents changing
stroke or stroke exhaust valve is open.
the temperature change from T_4 to T_1 but
volume remains constant. & heat rejected
is Φ_2 .

Consider +) Carnot Reversible
Cycle.

B to C,

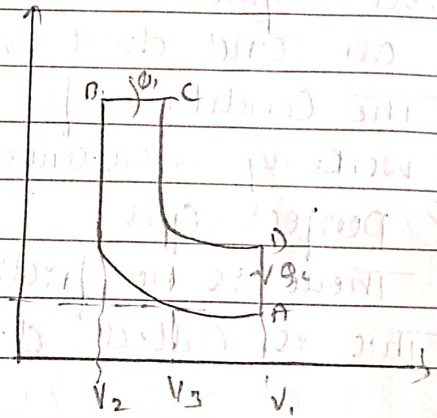
Here pressure is constant

$$\Phi_1 = 1 \times C_p (T_3 - T_2) \quad \text{--- (1)}$$

from D to volume remains
constant

$$\Phi_2 = 1 \times C_v (T_4 - T_1) \quad \text{--- (2)}$$

dividing
subtracting (1) & (2)



$$\frac{\Phi_2}{\Phi_1} = \frac{C_v (T_4 - T_1)}{C_p (T_3 - T_2)} \quad \text{--- (3)}$$

we know $\frac{C_p}{C_v} = \gamma$ adiabatic ^{expansion} compression

from adiabatic equation

$$P V^\gamma = C$$

$$T_1 V_1^{\gamma-1} = T_2 V_2^{\gamma-1} \quad \text{--- (4)}$$

and.

$$T_4 V_1^{\gamma-1} = T_3 V_3^{\gamma-1} \quad \text{--- (5)}$$

subtracting (4) & (5) we get

$$(T_4 - T_1) V_1^{r-1} = (T_3 - T_2) V_2^{r-1}$$

Express the cell values in terms of T_2 .

$$T_1 = T_2 \left(\frac{V_2}{V_1} \right)^{r-1}$$

$$P = \frac{V_2}{V_1}$$

$$= T_2 \left(\frac{1}{P} \right)^{r-1} \quad \text{--- (6)}$$

$$T_3 = e T_2 \quad \text{--- (7)}$$

$$T_4 = T_3 \left(\frac{V_3}{V_2} \right)^{r-1}$$

$$= e T_2 \left(\frac{V_3}{V_2} \right)^{r-1} \left(\frac{V_2}{V_1} \right)^{r-1}$$

$$= e T_2 (e)^{r-1} \left(\frac{1}{P} \right)^{r-1}$$

$$= T_2 e^r \left(\frac{1}{P} \right)^{r-1} \quad \text{--- (8)}$$

from T_1, T_2, T_3, T_4

$$\eta = 1 - \frac{\Phi_2}{\Phi_1}$$

$$= 1 - \frac{1}{\lambda} \left(\frac{T_2 e^r \left(\frac{1}{P} \right)^{r-1} - T_2 \left(\frac{1}{P} \right)^{r-1}}{e T_2 - T_2} \right)$$

$$= 1 - \frac{1}{\lambda} \left(\frac{1}{P} \right)^{r-1} \frac{(e^r - 1)}{e(e - 1)}$$

(a)

$T_1 = 400 \text{ K}$

$\Phi_2 \rightarrow 150 \text{ cal}$

$\Phi_1 \rightarrow 200 \text{ cal}$

$T_2 = ?$

$\eta = ?$

We have relation

$$\frac{\Phi_1}{\Phi_2} = \frac{T_1}{T_2}$$

$$\Rightarrow T_2 = T_1 \left(\frac{\Phi_1}{\Phi_2} \right)$$

$$= 400 \left(\frac{200}{150} \right)$$

$$= 400 (1.33)$$

$$= 533.3 \text{ K}$$

$$\eta = 1 - \frac{\phi_2}{\phi_1} \quad \text{or} \quad \eta = \frac{5}{150}$$

$$= 1 - 0.33$$

$$= 0.333 //$$

$$= 0.33$$

$$\eta\% = 0.333 \times 100$$

$$= 33.3$$

$$= 0.667$$

b) It is ratio of work done by the engine to the heat absorbed at higher temperature

$$\eta = \frac{\text{Work done}}{\text{Heat absorb}}$$

$$= \frac{\phi_1 - \phi_2}{\phi_1}$$

ϕ_1 - heat absorb
 ϕ_2 - heat rejected.

c) It is ratio of ^{change drain} ~~change drain~~ ^{change drain} source voltage to the ^{change drain} ~~change drain~~ ^{change drain} current at constant gate source voltage

$$r_d = \left(\frac{\Delta V_{DS}}{\Delta I_D} \right)_{V_{GS}}$$

ΔV_{DS} - change drain source voltage

ΔI_D - change drain current

V_{GS} - Gate source voltage.

d) The change in entropy must be zero

$$\Delta S = 0.$$



B. L. D. E. Association's

S. B. ARTS & K. C. P. SCIENCE COLLEGE, VIJAYAPUR

Ist

INTERNAL TEST 20 -20

Name / ಹೆಸರು : Spoorti S. Siddapur Roll No./ಸ್ಥಳಾಂಕ : _____ Date / ದಿನಾಂಕ : 10-7-2024

Subject/ವಿಷಯ : Physics - I Semester/ಸೆಮಿಸ್ಟರ್ : VI Exam Seat No / ಪರೀಕ್ಷೆ ಸ್ಥಳಾಂಕ : U15KM2160372

30 / 30

Invigilator's Signature / ಕೊಠಡಿ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ Signature of Evaluator / ಪರೀಕ್ಷಕರ ಸಹಿ Marks obtained/ ಪಡೆದ ಅಂಕಗಳು

15 / 15

Q No I

a It states that ratio of thermal conductivity and electrical conductivity is directly proportional to absolute temperature.

$$\frac{k}{\sigma} \propto T$$

$$\frac{k}{\sigma} = LT$$

L = Lorentz number.

$$L = 2.44 \times 10^{-8} \text{ W}\Omega\text{K}^{-2}$$

c Two important hypothesis are Proton-Electron hypothesis and Proton-Neutron hypothesis.

e Fermi energy is the energy of the highest occupied quantum state in the system of the fermions at absolute zero temperature.

d Two constituent of nucleus are proton and neutron.

II

a. Electrical conductivity is the flow of electricity per unit area in the conductor, denoted as σ .
Now.

When the Electricity is applied to the conductor the free electrons in the conductor get accelerated and produce heat electricity (I) or current (I). n be number of electrons moving in unit time. ' e ' be charge of electron and the current flow per unit area σ in unit time i.e current density is given by

$$J = n v_d e \rightarrow (1) \quad v_d \rightarrow \text{drift velocity.}$$

Accelerated electrons is given by equation

$$a = \frac{v_d}{\lambda} \rightarrow (2) \quad \text{drift velocity} \\ \text{relaxation time.}$$

When Electricity is applied the force produced is given by

$$F = eE \rightarrow (3)$$

From Newtons second law Force is given as

$$F = ma \rightarrow (4)$$

equating eq (3) & (4) we get

$$ma = eE$$

$$a = \frac{eE}{m} \rightarrow (5)$$

Equating equation (5) & (2) we get

$$\frac{v_d}{\lambda} = \frac{eE}{m}$$

$$v_d = \frac{eE\lambda}{m} \rightarrow (6)$$

Substitute eq 6 in eq (1)

we get

$$J = n \frac{e E e \lambda}{m \lambda}$$

$$J = \frac{n e^2 E \lambda}{m}$$

W.K.T

Electrical conductivity

$$\sigma = \frac{J}{E}$$

$$= \frac{n e^2 E \lambda}{m E}$$

$$\sigma = \frac{n e^2 \lambda}{m}$$

expression for electric conductivity = $\frac{n e^2 \lambda}{m}$

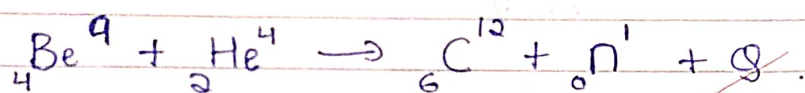
b. Failure of Classical free electron theory

- i. The theoretical value ($C_v = \frac{3}{2} R$) and experimental value ($C_v = 10^{-4} R T$) of specific heat do not agree with each other.
- ii. The theoretical value ($\sigma \propto 1/\sqrt{T}$) and experimental value ($\sigma \propto 1/T$) of temperature dependent electrical conductivity value do not agree with each other.
- iii. Electrical conductivity $\sigma = \frac{n e^2 \lambda}{m}$ from this conductivity is directly proportional current density of the metal. From this value we can say that conductivity of monovalent is less than divalent & trivalent metals. But theoretically conductivity of divalent & trivalent is less than that of the monovalent metals.
- iv. This theory does not explain the conductivity of the semiconductors & insulators properly.

Q No.
III

a. Theory of proton - Neutron Hypothesis

- Proton - Electron theory is rejected due to property of free electrons.
- Rutherford α particle experiment shown that electrons are absent in nucleus.
- Scattering of α particle given that electron does not exist in nucleus.
- James Chadwick discovered the neutron from his Beryllium experiment



- Neutron is the chargeless particle it does not react with magnetic & electric field.
- Neutron has high penetrating power.
- Nucleus consists of proton and neutron. These together called nucleons. Mass number (A) = no. of protons + neutrons

$$A = p + n$$

$$A = Z + n$$

Diameter of the nucleus is 10^{-14}m .

Uncertainty in the position is

$$\Delta x \approx 10^{-14}\text{m}$$

Uncertainty in the momentum of the nucleus is

$$\Delta p_x \Delta x = \frac{h}{2}$$

$$\Delta p_x = \frac{h}{2 \times \Delta x}$$

$$= \frac{h}{4\pi \times \Delta x} = \frac{6.626 \times 10^{-34}}{4 \times 3.14 \times 10^{-14}}$$

$$= 0.5275 \times 10^{-20} \text{ kg m/s.}$$

Then velocity of the nucleus is given as $V = \frac{\Delta P_N}{m_p}$

mass of proton = $1.67 \times 10^{-27} \text{ kg}$

$$V = \frac{0.5275 \times 10^{-20}}{1.67 \times 10^{-27}}$$

$$= 0.3158 \times 10^7 \text{ m/s}$$

Energy of the nucleus = $V = \frac{P_N^2}{2m_p}$

$$= \frac{0.5275 \times 10^{-20} \times 0.5275 \times 10^{-20}}{2 \times 1.67 \times 10^{-27}}$$

$$= 52 \text{ MeV}$$

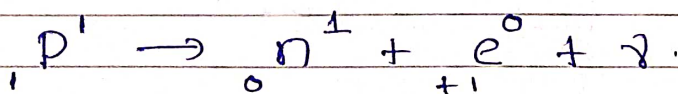
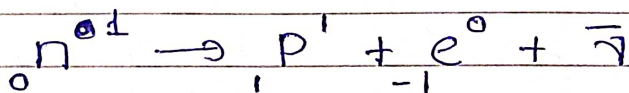
$$= 52 \text{ keV}$$

Energy of nucleus $\geq 52 \text{ keV}$ this shows that it is difficult to remove electron, proton & neutron from nucleus.

The magnitude of magnetic momentum of proton & neutron is same & the nuclear magneton is given as:

$$\mu_N = \frac{e h}{4 \pi m_p}$$

Mass of neutron almost same as that of the proton. They are separated from nucleus when radioactive disintegration takes place.



Elements are further classified into

- i Isotopes: Elements have same atomic number but different mass number. ex: $\text{H}^1, \text{H}^2, \text{H}^3$
- ii Isobars: Elements have same mass number but different atomic number. ex: ${}_3^7\text{Li}, {}_4^7\text{Be}$
- iii Isotones: Same neutron number

b. Nuclear Size / Radius is
 In the Rutherford α -particle scattering experiment the size of the nucleus is discovered. As α particle hit the Gold foil the α particle scatter back. from this experiment Volume of nucleus is directly proportional to mass number.

$$V \propto A$$

$$\frac{4}{3}\pi R^3 \propto A$$

$$R^3 \propto A$$

$$R \propto A^{1/3}$$

$$R = R_0 A^{1/3}$$

$$R_0 = 1.2 \text{ fermi}$$

Nucleus size = size.
Atomic size

S = Size of hydrogen atom

$$= 0.5 \text{ \AA} = 50,000 \times 10^{-15} \text{ m}$$

$$\text{Size of nucleus} = 0.8 \times 10^{-15} \text{ m}$$

$$\text{Size} = \frac{0.8 \times 10^{-15}}{50,000 \times 10^{-15}}$$

$$= 65,500$$

Nucleus is 65,500 times smaller than atom.

Q No II

d.

Electrical conductivity $\sigma = 298 = 6.22 \times 10^7 \text{ SI unit}$
thermal conductivity $k = 423 \text{ SI unit}$

$$L = \frac{k}{\sigma} \quad \frac{k}{\sigma} = LT$$

$$L = \frac{k}{\sigma T} = \frac{423}{6.22 \times 10^7 \times 293}$$

$$= 0.232 \times 10^{-7} \text{ W } \Omega \text{ K}^{-2}$$

$$[\text{Lorentz number} = 0.232 \times 10^{-7} \text{ W } \Omega \text{ K}^{-2}]$$



B. L. D. E. Association's

S. B. ARTS & K. C. P. SCIENCE COLLEGE, VIJAYAPUR

II Internal INTERNAL TEST 2023 -2024

Name / ಹೆಸರು: Voishnavi J. Angadi Roll No./ಸ್ಥಳಾಂಕ: _____ Date / ದಿನಾಂಕ: 10/7/2024
Subject/ವಿಷಯ: Physics - I Semester/ಸೆಮಿಸ್ಟರ್: VI Exam Seat No / ಪರೀಕ್ಷೆ ಸ್ಥಳಾಂಕ: 015K172130511

Invigilator's Signature / ಕೊಠಡಿ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ Signature of Evaluator / ಪರೀಕ್ಷಕರ ಸಹಿ Marks obtained / ಪಡೆದ ಅಂಕಗಳು

20 / 30

Q No 1

- a) Wiedman - Franz law - It is the ratio of thermal conductivity and electrical conductivity is directly proportion to the absolute temperature.

$$\frac{k}{\sigma} \propto T$$

$$\frac{k}{\sigma} = LT$$

where L is Lorentz constant its value is $2.44 \times 10^{-8} \text{ m}^2/\text{K}^2$

- b) Fermi Energy :- Fermi energy is a energy of highest occupation of quantum state of the fermions at absolute zero temperature called Fermi energy.

- d) * The two constituent particles of the nucleus are proton and neutron.

* The mass of the atom is concentrated at the center of the atom i.e nucleus.

* The charge of the nucleus is (+ve). due to presence of proton.

- e) Two hypothesis are
* proton electron hypothesis
* proton neutron hypothesis

Q.No. II

a) let us apply some electric field to the conductor. due to the applied electric field the electrons are accelerated and gives rise to the current flow I . then the current density is given by

$$J = n v_d e \quad \text{--- (1)}$$

Due to the electric field the electrons are accelerated given by

$$a = \frac{\text{drift velocity } (v_d)}{\text{relaxation time } (\tau)} \quad \text{--- (2)}$$

$$a = \frac{v_d}{\tau} \quad \text{--- (3)}$$

Due to the applied electric field the electron experiences some force F given by

$$F = E e \quad \text{--- (4)}$$

Due to Newton second law the electron experiences some force given by

$$F = ma \quad \text{--- (5)}$$

from eq (4) & (5) we have

$$ma = E e$$

$$a = \frac{E e}{m} \quad \text{--- (6)}$$

from eq (3) & (6) we have

$$\frac{v_d}{\tau} = \frac{E e}{m}$$

$$v_d = \frac{E e \tau}{m} \quad \text{--- (7)}$$

Substitute the value of $\ominus$ in ①

$$J = n \left(\frac{eE\tau}{m} \right) e$$

$$J = n \left(\frac{eE^2\tau}{m} \right) \quad \text{--- ⑤}$$

electric conductivity

$$\sigma = \frac{J}{E} = \frac{nEe^2\tau}{mE}$$

$$\boxed{\sigma = \frac{ne^2\tau}{m}}$$

This is required electrical conductivity.

b) Failures of classical free electron theory

* The theoretical value of $(C_v = \frac{3}{2} R)$ and the experiment value of $(C_v = 10^{-24} R)$. The specific heat value are not same in both.

* The theoretical value $(\sigma \propto \frac{1}{\sqrt{T}})$ The experimental value $(\sigma \propto \frac{1}{T})$ both are not same.

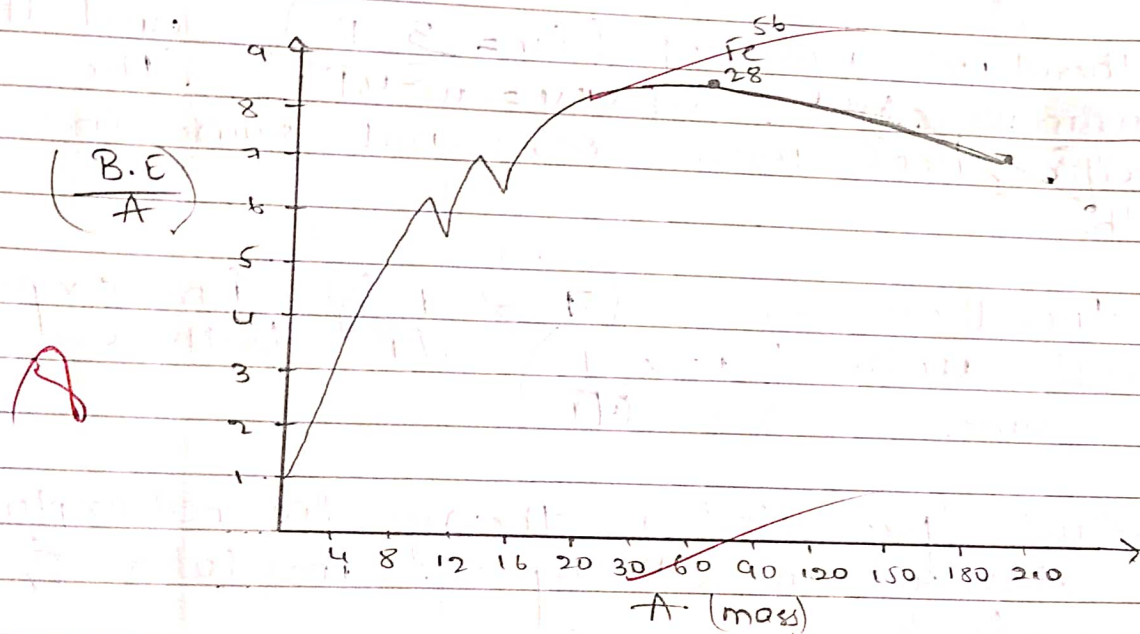
* Classical free electron theory does not explain the electrical conductivity of insulator, semiconductor.

* From the equation of electrical conductivity $(\sigma = \frac{ne^2\tau}{m})$ the σ is directly proportional to the density but the value of electric density of bf is high for mono compared to di & tri .

Q No III

3 c) The main features of Binding energy versus mass Number curve.

- * The variation of Binding energy due to the mass number is our curve.
- * The ~~max~~ graph is plotted between the binding energy and mass number (A) it is signifying to explain the stability of the nucleus and other property.
- * The average binding energy of the nucleons of nucleus is the energy required to remove the one nucleons from nucleus.
- * The curve plotted between binding energy or mass number is called Binding energy curve.



1) The value of $(B.E./A)$ for the small nucleus having mass number less than 30 (e.g. H^2 , He^4) are small.

2) The mass number ranging between (2 - 20) are having well defined corresponding peak for He^4 , C^{12} , O^{16} are having more stable compare to neighbouring nuclei like Li^6 , Li^7 & N^{14} .

3) The mass number lies between (3 - 170) having same the variation of (BE/A) is very small almost constant.

4) The maximum (BE/A) is 8.8 MeV for $^{56}_{28}\text{Fe}$.

5) If the value of mass number increase the (BE/A) value decreases slowly and it falls to 7.6 for U^{235} . This is due to the columb repulsion of the proton due to the increase in mass number.

Importance of Binding energy curve

* If the value of mass number is high the (BE/A) is unstable, to make it stable the high nucleids are split into middle mass nucleide so that they become stable and nuclear fission takes place.

* If the value of mass number is small the value of (BE/A) is unstable to make it stable then we combine the low mass nucleide to form middle mass nucleide. Hence nuclear fusion takes place.

d) Note on Nuclear Density - Mass per unit volume of the nucleus

$$\text{Nuclear Density} = \frac{\text{mass of nucleus}}{\text{Volume of nucleus}}$$

$$\rho = \frac{\text{mass of one nucleon} \times \text{no. of nucleons}}{\frac{4}{3} \pi R^3}$$

$$\rho = \frac{m \cdot A}{\frac{4}{3} \pi (R_0 A^{1/3})^3}$$

$$= \frac{1.67 \times 10^{-27}}{\frac{4}{3} (1.2 \times 10^{-15})^3}$$

$$\boxed{\rho = 2.97 \times 10^{17} \text{ kg/m}^3}$$

8 Nov II d) $\sigma = 6.22 \times 10^{-7}$
 $K = 423$
 $T = 293$
 $L = ?$

$$\frac{K}{\sigma} = LT$$

$$\frac{423}{6.22 \times 10^{-7} \times 293} = L$$

$$\boxed{L = 2.32 \times 10^{-8} \text{ m}^2/\text{K}^2}$$



B. L. D. E. Association's

S. B. ARTS & K. C. P. SCIENCE COLLEGE, VIJAYAPUR

First

INTERNAL TEST 2023-2024

Name / नाव: Priyanka S. Patil

Roll No / रोल नं: _____

Date / तारीख: 19/01/2024

Subject / विषय: Electronic Inst. & Semesters: VI Exam Seat No / परीक्षा स्थान नं: 015K1M2150177
umentation and Sensors

Invigilator's Signature / परीक्षक की हस्ताक्षर: _____ Signature of Evaluator / मूल्यांकन की हस्ताक्षर: _____ Marks obtained / अंक प्राप्त: 30/30

I.

a) In a Single phase consist the power distributed in a two wires is known as single phase

q. In a three phase power supply consist three or four wires is known as three phase power supply

b) Ripple factor: It is defined by the ratio of the ripple voltage to the pure DC voltage

$$\text{ripple factor} = \frac{\sqrt{(V_{rms})^2 - V_{DC}^2}}{V_{DC}}$$

Peak inverse voltage = The maximum voltage that a diode can have during reverse biased condition.

2. P.E.

d) Dirichlet has formulated certain condition is known as Dirichlet's condition.

→ The signal/function absolutely integrable over the range $\left| \int_{-\infty}^{\infty} f(t) dt \right| < \infty$

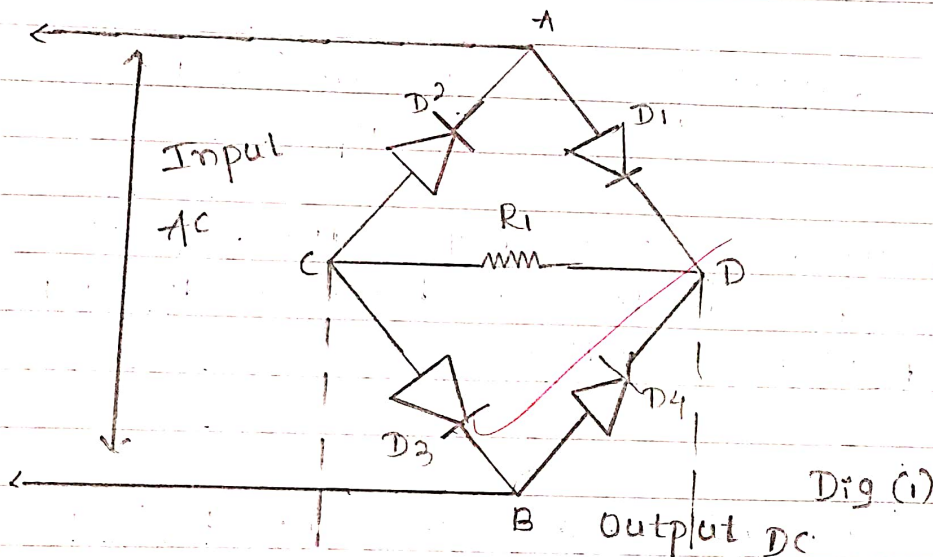
→ Should have a finite number of maxima/minima

→ Should have a finite number of discontinuities.

Q] Rectifier is used to convert AC power to DC power. Bridge rectifier is a type of rectifier, full wave rectifier. It consists of four diodes that diodes use to convert AC power to DC power.

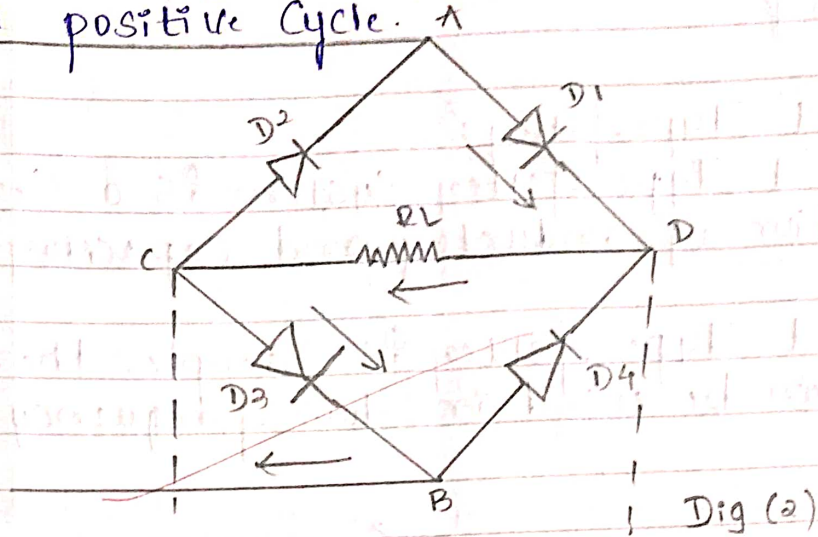
Construction:

The construction of Bridge rectifier consists of four diodes (D_1, D_2, D_3, D_4) and load resistance. The four diodes are connected in closed configuration that can convert into AC current to DC current.



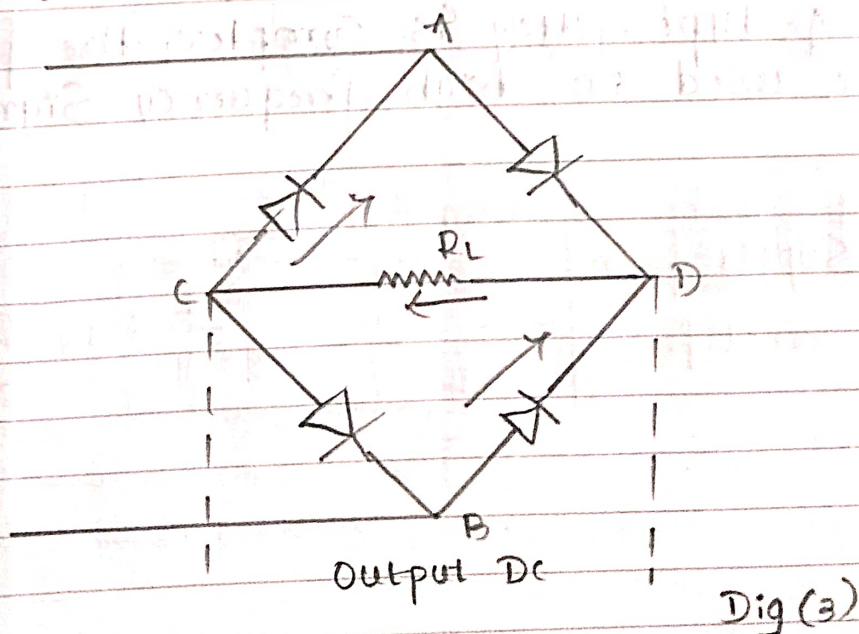
The input signal applied across a terminal A & B. The output signal obtained across a load resistance. The terminal connected between C & D. The terminal connected in a way that four diodes can conduct electricity during positive half cycle. During D_1 and D_3 are some diodes can conduct electricity during positive half cycle. D_2 and D_4 are some diodes can conduct electricity during negative half cycle.

working: When AC Signal applied on bridge rectifier the terminal A become positive. the terminal B become negative. During D_1 and D_3 are forward bias and D_2 and D_4 are reverse bias Condition on a positive Cycle.

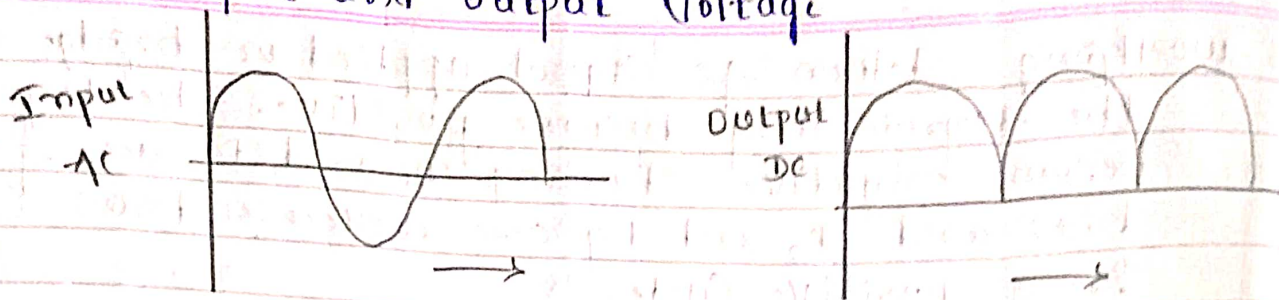


8 The Current flows in a positive Cycle shown in Fig (2). the Current flows in a negative Cycle shown in Fig (3).

During a negative Cycle. AC Signal applied on bridge rectifier the terminal A become negative the terminal B become positive. During D_2 and D_4 are forward bias and D_1 and D_3 are reverse biased Condition.



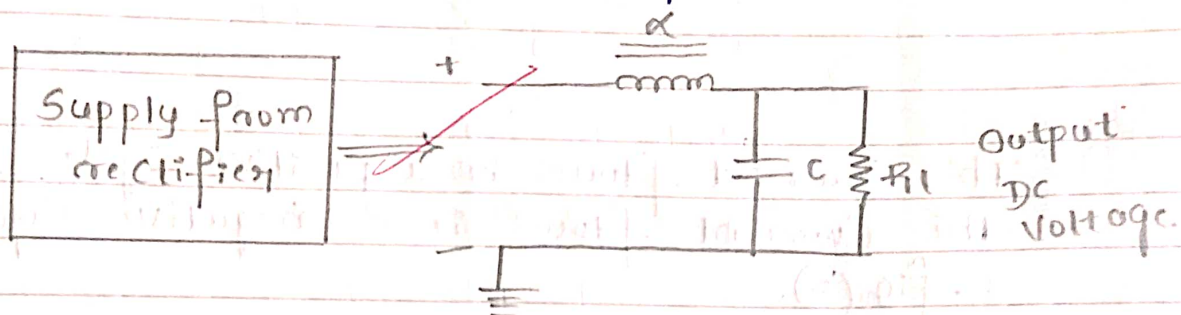
Input and output Voltage



→ L-Type filter:

→ L-Type filter system is a series combination of inductor and capacitor

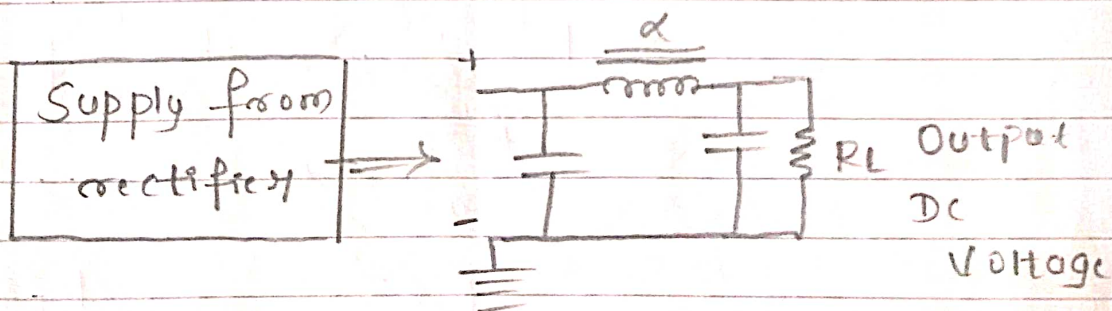
→ L-Type filter is simple. the filter can be used in low frequency signal



→ π -type filter

→ π -type filter system is a series combination of capacitor and another capacitor in π shape.

→ π -type filter is complex. the filter can be used in high frequency signal



iii

by $f(x) = 1 \quad [0, 1]$

$$f(x) = \sum_{n=1}^{\infty} b_n \frac{\sin n\pi x}{1}$$

$$1 = \sum_{n=1}^{\infty} b_n \frac{\sin n\pi x}{2}$$

$$b_n = \frac{2}{1} \int_0^1 f(x) \frac{\sin n\pi x}{1} dx$$

$$= 2 \int_0^1 1 \cdot \frac{\sin n\pi x}{1} dx$$

$$= 2 \left[-\frac{\cos n\pi x}{\frac{n\pi}{1}} \right]_0^1$$

$$= \frac{2}{n\pi} \left[-\cos n\pi + \cos(0) \right]$$

$$= \frac{2}{n\pi} \left[(-1)^{n+1} + 1 \right]$$

$$x = \left\{ \begin{array}{ll} \frac{4}{n\pi} & \text{when } n \text{ is odd} \\ 0 & \text{when } n \text{ is even} \end{array} \right\}$$

$$f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} \frac{\sin \pi x}{1} + \frac{1}{3} \sin 3\pi x + \frac{1}{5} \sin 5\pi x + \dots$$

iii)

$$\text{ay } f(x) = \frac{a_0}{2} + a \cos x + a_2 \cos 2x + \dots + a_n \cos nx$$

$$- \dots + b_1 \sin x + b_2 \sin 2x + \dots + b_n \sin nx$$

$$f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos nx + \sum_{n=1}^{\infty} b_n \sin nx$$

$$f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} [a_n \cos nx + b_n \sin nx]$$

Here $a_0, a_1, \dots, a_n$ and b_n are the coefficient

iy To find a_0 :

To find a_0 integrate both Side by
 $x=0$ to $x=2\pi$

$$\int_0^{2\pi} f(x) dx = \frac{a_0}{2} \int_0^{2\pi} dx + a_1 \int_0^{2\pi} \cos x dx + a_2 \int_0^{2\pi} \cos 2x dx + \dots$$

$$+ a_n \int_0^{2\pi} \cos nx dx$$

$$+ b_1 \int_0^{2\pi} \sin x dx + b_2 \int_0^{2\pi} \sin 2x dx + \dots$$

$$+ a_n \int_0^{2\pi} \sin nx dx$$

$$\text{Here } \int_0^{2\pi} \cos nx dx = 0 \text{ \& } \int_0^{2\pi} \sin nx dx = 0$$

$$\int_0^{2\pi} f(x) dx = \frac{a_0}{2} \int_0^{2\pi} dx$$

$$= \frac{a_0}{2} x \Big|_0^{2\pi}$$

$$\int_0^{2\pi} f(x) dx = \frac{a_0}{2} \times 2\pi = a_0\pi \quad \Rightarrow \quad \boxed{a_0 = \frac{1}{\pi} \int_0^{2\pi} f(x) dx}$$

iiy To find a_n :

To find a_n integrate both Side by
 $x=0$ to $x=2\pi$

multiply $\cos nx$.

$$\int_0^{2\pi} f(x) \cos nx \, dx = \frac{a_0}{2} \int_0^{2\pi} \cos nx \, dx + a_1 \int_0^{2\pi} \cos x \cos nx \, dx + \dots + a_n \int_0^{2\pi} \cos^2 nx \, dx + \dots + b_1 \int_0^{2\pi} \sin x \cos nx \, dx + b_2 \int_0^{2\pi} \sin 2x \cos nx \, dx + \dots + b_n \int_0^{2\pi} \sin nx \cos nx \, dx$$

an = Here $\int_0^{2\pi} \cos nx \, dx = 0$ $\int_0^{2\pi} \sin nx \, dx = 0$

$$\int_0^{2\pi} \cos^2 nx \, dx = \pi$$

$$\int_0^{2\pi} f(x) \cos nx \, dx = a_n \int_0^{2\pi} \cos^2 nx \, dx$$

$$\int_0^{2\pi} f(x) \cos nx \, dx = a_n \pi$$

$$a_n = \frac{1}{\pi} \int_0^{2\pi} f(x) \cos nx \, dx$$

iii) To find b_n :

To find b_n integrate both side by $x=0$ to $x=2\pi$
multiply both $\sin nx$

$$\int_0^{2\pi} f(x) \sin nx \, dx = \frac{a_0}{2} \int_0^{2\pi} \sin nx \, dx + a_1 \int_0^{2\pi} \sin x \cos x \, dx + a_2 \int_0^{2\pi} \cos 2x \sin nx \, dx + \dots + a_n \int_0^{2\pi} \cos nx \sin nx \, dx + b_1 \int_0^{2\pi} \sin x \sin nx \, dx + b_2 \int_0^{2\pi} \sin 2x \sin nx \, dx + \dots + b_n \int_0^{2\pi} \sin^2 nx \, dx$$

Here $\int_0^{2\pi} \sin^2 nx \, dx = \pi$

$$\int_0^{2\pi} \cos nx \, dx = 0 \quad \int_0^{2\pi} \sin nx \, dx = 0$$

$$\int_0^{2\pi} f(x) \sin nx \, dx = b_n \int_0^{2\pi} \sin^2 nx \, dx$$

$$\int_0^{2\pi} f(x) \sin nx \, dx = b_n \pi$$

$$b_n = \frac{1}{\pi} \int_0^{2\pi} f(x) \sin nx \, dx$$

Name - Aishwarya Seelin
class - Bsc 6th sem
UUCMS NO - UISKM2150330
Roll. NO - 214
Sub - physics - II

30
30

18
15

Q. NO. I

a) Electronic voltage regulator is defined as the output dc voltage is not effected by the input dc voltage.

c) Thermistors which are the resistors which gives the negative temperature coefficient these are called thermistors.

d) The piezo resistive effect which is defined as it is related to the strain and it is defined as the change in the resistivity of the conductor it is subjected to strain.

b) DC Ammeter - It is the device used to which measured the current is called DC Ammeter.

2) DC voltmeter - It is the device which is used to measure the voltage in the circuit by using the DC voltmeter.

Q. NO. II

a) Transducer :-

* which are defined as transducers converted one form of energy into other form of energy.

Ex:- Solar pannel, antenna.

* types $\rightarrow$ - there are 3 types of transducers

1. Active and passive transducers
2. primary & secondary transducers
3. -Analogue & digital transducers.

based on -the principle of operation
-these are 3 types

- 1) Inductive transducer
- 2) Capacitive transducer
- 3) Resistive transducer

1) -Active and passive transducers

1) * -Active transducers

In a active transducer
-there is ~~no~~ external power
Source is not required for
-the conversion of energy.
Ex:- photovoltaic cell.

* passive transducers:

In a passive transducers
-there ~~is~~ external power source
is required for the energy
conversion.
Ex:- thermistor.

2) primary and secondary transducers.

- In these transducers the
Sensor sensor is sensed by the
transducer which is the physical
phenomenon for conversion to
Electrical form.

3) -Analogue & digital transducers

* -Analogue transducer:

$\therefore$ -this transducer gives

the output in the analogue form.

* digital transducer

8 :- the digital transducer which gives output in the form of digital manner are called digital transducer.

Q.no. III. b)

b) factors governing the selection of transducers

* 1) operating range :-

the operating range of the transducer should be large enough for the magnitude of other transducers.

* 2) Selection of transducers :-

for the selection of the transducers we must know about their physical phenomenon & ability and capacity.

* 3) types of transducers :-

4 for the selection of transducers it is very imp to select their types and properties, and its height and weight etc.

* 4) Specifications of transducers

for the selection of transducers we must know about their quality and quantity like intensity, height, capacity, width etc.

* 5) Sensors / Sensitivity

for the selection of transducers it is very important to select the sensitive transducer to avoid errors.

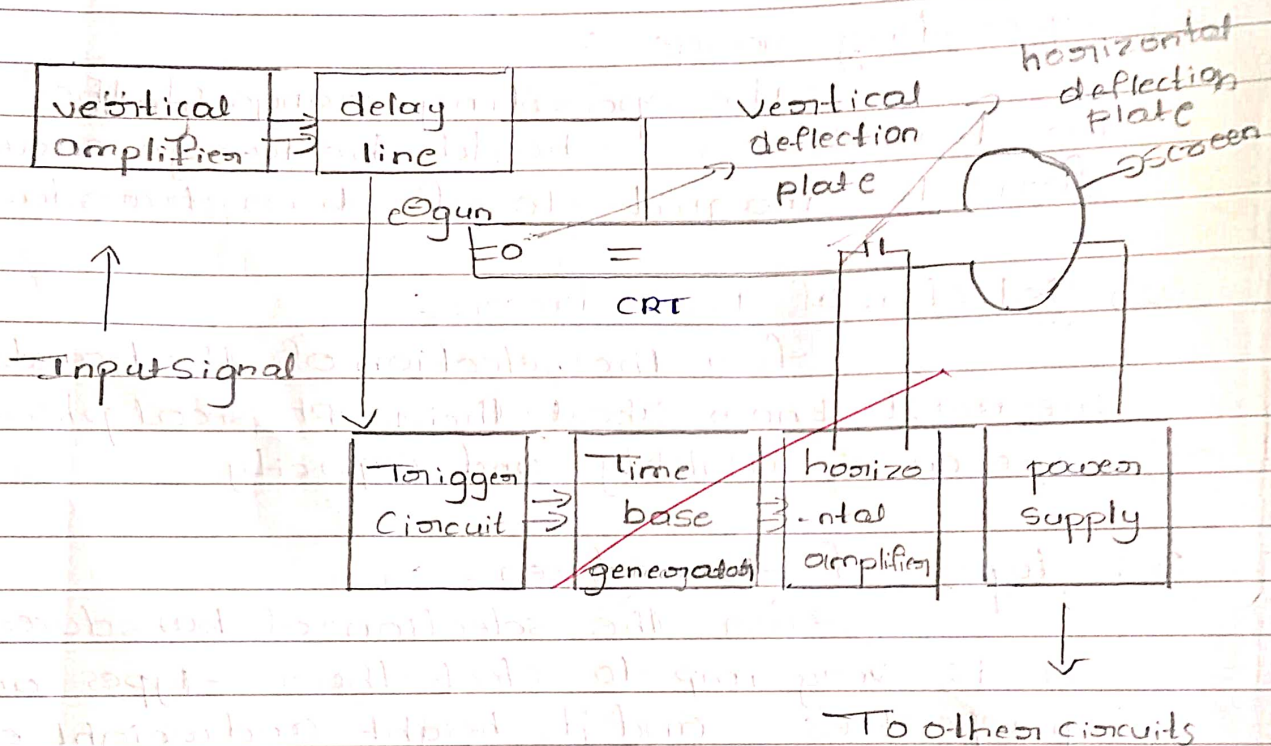
* 6) Errors:

- For the selection of the transducers to we must avoid errors in their given result. It must be very small and negligible.

* Intensity of transducers must be observed.

Q. No 11

CRO → Cathode ray Oscilloscope :-
It is an electrical instrument used to display or analyse the wave form by the electrical signal.



* principle :-

- The CRO works based on the high speed of e⁻ beam in the presence of electrical and magnetical field and analyse the wave form the electrical signal.

- The block diagram of CRO consist of sets of vertical amplifier, delay line, Trigger circuit, Time base

generator, horizontal amplifier and power supply.

* 1) Vertical amplifier

which receives the signals from the input signal and displays on the CRT of the screen which next applied to delayed line.

* 2) Delay line:-

which gives the delayed output signal from the vertical amplifier's signal which is next applied to vertical display plate.

* 3) Trigger circuit:-

8 In a trigger circuit the trigger signals are generated and these are combined by horizontal and vertically. it is next applied to the time base generator.

* 4) Time base generator:-

In this out signal comes from trigger circuit these are next applied to the horizontal amplifier.

* 5) Horizontal amplifier:-

which amplifies the output signals from time base generator and amplifies horizontal scan e0.

* 6) power supply:-

The signals or output comes from the horizontal amplifier next applied to power supply then it gives signals next to supply applied for electron beam then these are finally displayed on signal display.

II d) Features of cathode ray tube

It consist of mainly 4 parts.

1. Electron beam / e^- gun
2. Horizontal deflection plate
3. Vertical deflection plate
4. Fluorescent screen.

* 1. Electron beam :- It is the focus of beam of electrons are called electron beam / e^- gun.

* 2. Horizontal deflection plate :-
As a name implies in which the on by using of this plate horizontal signals are displayed.

* 3. Vertical deflection plate :-
As a name implies in which the vertical signals are displayed by using vertical deflection plate.

* 4. Fluorescent screen :-
The strong beam of electrons which are reflected by the screen to gives light.

Name / ಹೆಸರು: Akshata. T. Biradar Roll No./ಸ್ಥಳಾಂಕ: 314 Date/ದಿನಾಂಕ: 03-01-2024Subject/ವಿಷಯ: physics Semester/ಸೆಮಿಸ್ಟರ್: Ist Exam Seat No./ಪರೀಕ್ಷೆ ಸ್ಥಳಾಂಕ: _____

Invigilator's Signature / ಕೂರಡಿ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ Signature of Evaluator / ಪರೀಕ್ಷಕರ ಸಹಿ Marks obtained/ಪಡೆದ ಅಂಕಗಳು

30/30

15/15
P

b) The property of liquid material by virtue of which its free surface behaves like an elastic membrane is called "surface tension".

c) The rate of change of velocity of flow of liquid with respect to the normal distance measured normal to the direction of flow is called 'velocity gradient'. $(\frac{dv}{dx})$

c) Scalar product :- The sum of product of corresponding entries of two sequence of numbers.

$$\vec{a} \cdot \vec{b} = |\vec{a}| |\vec{b}| \cos \theta$$

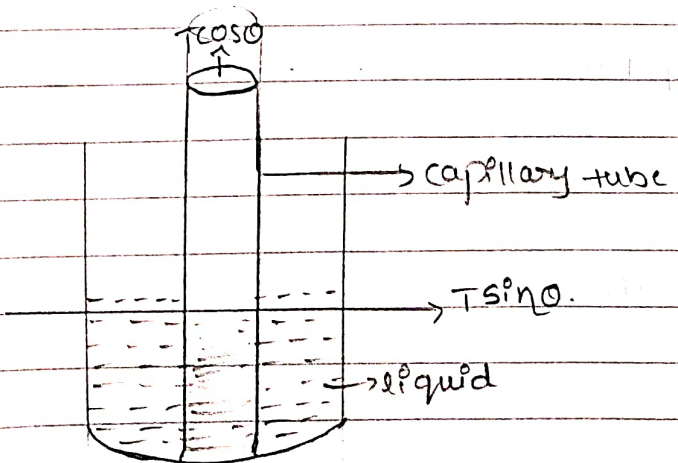
d) Vector product :- The vector product of two vectors refers to a vector that perpendicular to both of them.

$$\vec{a} \times \vec{b} = ab \sin \theta$$

Q. NO II

c)

8



The phenomena of rise of or ^{fall} of liquid in the capillary tube is called 'Capillarity'.

When a capillary tube is dipped in a beaker containing water, then small amount of water will be rises in a capillary tube vertically upward direction. Inner surface of capillary tube experience two force like. ① vertically upward force and ② horizontal downward force.

The volume of liquid = $\pi r^2 h$

The volume of liquid in meniscus = Volume of liquid in cylinder at h - Volume of hemisphere

$$= \pi r^3 - \frac{2}{3} \pi r^3$$

$$= \frac{1}{3} \pi r^3$$

∴ Total volume of liquid = $\pi r^2 h + \frac{1}{3} \pi r^3$

$$= \pi r^2 (h + r/3)$$

Weight of liquid = $\pi r^2 (h + r/3) \rho g$

$T \cos \theta \cdot 2\pi r = \pi r^2 (h + r/3) \rho g$

$2T \cos \theta = r \rho g h$

$$\boxed{T = \frac{r \rho g h}{2 \cos \theta}} \quad \text{or} \quad \boxed{h = \frac{2T \cos \theta}{r \rho g}}$$

T → Surface tension

r → radius of capillary tube

g → gravitation

ρ → density

h → height of capillary tube.

ds $r = 1 \text{ mm} \Rightarrow 1 \times 10^{-3} \text{ m}$

Surface tension $\Rightarrow 73 \times 10^{-3} \text{ N/m}$.

$P = ?$

Formula, $P = \frac{2T}{r}$

$P = \frac{2 \times 73 \times 10^{-3}}{1 \times 10^{-3}}$

$$p = 146 \text{ N/m}$$

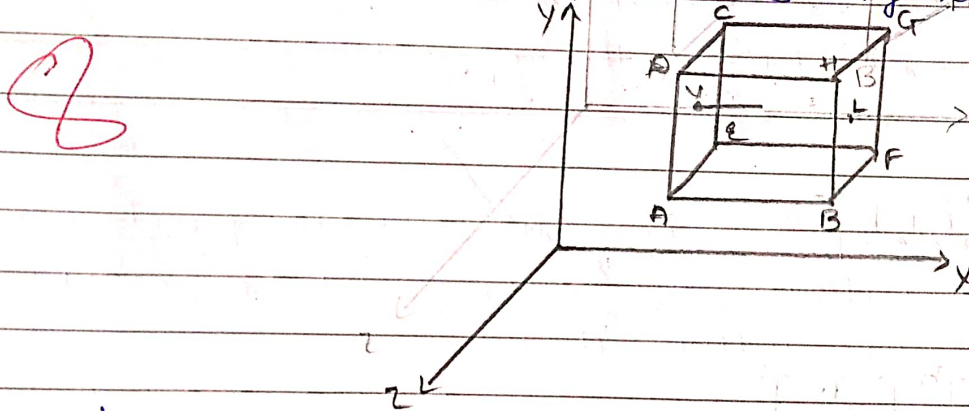
The excess of pressure inside a spherical liquid drop of water is $p = 146 \text{ N/m}$

Q. No III

a) divergence :- It is operation which performed on a vector and results in scalar quantity.

Physical interpretation of divergence and its significance :-

- ① ΔV is expanding or (+)ve $\rightarrow$ Divergence is increase
- ② ΔV is contracting or (-)ve $\rightarrow$ Divergence is decrease.
- ③ ΔV is remains same $\rightarrow$ Divergence is zero (0).



The outward flux in v the direction of (+)ve x is

$$\left(v_x + \frac{\partial v_x}{\partial x} \frac{dx}{2} \right) dy \cdot dz \rightarrow ①$$

The outward flux in v the direction of (-)ve x is

$$\left(v_x - \frac{\partial v_x}{\partial x} \frac{dx}{2} \right) dy \cdot dz \rightarrow ②$$

The net outward flux is

$$\left(v_x + \frac{\partial v_x}{\partial x} \frac{dx}{2} \right) - \left(v_x - \frac{\partial v_x}{\partial x} \frac{dx}{2} \right) dy \cdot dz$$

$$\frac{\partial v_x}{\partial x} dx dy \cdot dz \rightarrow ③$$

Similarly,

The outward flux in v the direction of y is $\frac{\partial v_y}{\partial y} dx \cdot dy \cdot dz \rightarrow ④$

The outward flux in the direction of z is

$$\frac{\partial v_z}{\partial z} dx \cdot dy \cdot dz \rightarrow \textcircled{5}$$

The outward flux in parallelepiped

$$\left(\frac{\partial v_x}{\partial x} + \frac{\partial v_y}{\partial y} + \frac{\partial v_z}{\partial z} \right) dx \cdot dy \cdot dz$$

The outward flux parallel per unit is

$$\left(\frac{\partial v_x}{\partial x} + \frac{\partial v_y}{\partial y} + \frac{\partial v_z}{\partial z} \right) dx \cdot dy \cdot dz$$

$$\therefore \text{Divergence} \pm \left(\frac{\partial v_x}{\partial x} + \frac{\partial v_y}{\partial y} + \frac{\partial v_z}{\partial z} \right) dx \cdot dy \cdot dz$$

$$\therefore \boxed{\text{Divergence} = \vec{\nabla} \cdot \mathbf{v}}$$

b) 1 force = ? dyne

$$\eta_1 [M_1^a L_1^b T_1^c] = \eta_2 [M_2^a L_2^b T_2^c]$$

$$\eta_2 = \eta_1 \left[\frac{M_1^a L_1^b T_1^c}{M_2^a L_2^b T_2^c} \right]$$

$$\eta_2 = 1 \left[\frac{M_1}{M_2} \right]^a \left[\frac{L_1}{L_2} \right]^b \left[\frac{T_1}{T_2} \right]^c$$

$$\eta_2 = 1 \left[\frac{\text{kg}}{\text{gm}} \right]^1 \left[\frac{\text{cm}}{\text{m}} \right]^1 \left[\frac{\text{s}}{\text{s}} \right]^{-2}$$

$$\eta_2 = 1 \left[\frac{1000 \text{ gm}}{\text{gm}} \right] \left[\frac{100 \text{ cm}}{\text{m}} \right] \left[\frac{\text{s}}{\text{s}} \right]^{-2}$$

$$\boxed{\eta_2 = 1 \times 10^5 \text{ dyne}}$$



S. B. ARTS & K. C. P. SCIENCE COLLEGE, VIJAYAPUR

B. L. D. E. Association's

Name / ಹೆಸರು: Madhumati G. G. G. G. 7th INTERNAL TEST 2023 -2024

Subject/ವಿಷಯ: physics Roll No./ಸ್ಥಳಾಂಕ: _____ Date/ದಿನಾಂಕ: 03-01-2024

Semester/ಸೆಮಿಸ್ಟರ್: III Exam Seat No / ಪರೀಕ್ಷೆ ಸ್ಥಳಾಂಕ: W15 KM 2250024

Invigilator's Signature / ಕೋರದಿ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ Signature of Evaluator / ಪರೀಕ್ಷಕರ ಸಹಿ Marks obtained / ಪಡೆದ ಅಂಕಗಳು

30
30

10
10

88%

1] The waves produced from plane wave sources are called plane waves.

2] The waves produced from point sources are called spherical waves.

3] "Two or more waves overlap or superimpose each other - the resultant amplitude of wave is equal to vector sum of individual waves."
 $y = y_1 + y_2$

4] "The phenomenon which two monochromatic sources superimpose & produce bands on screen due to coherent sources is called interference of light."

5] These are the massless particles of light waves. Newton called these particles as Corpuscles.

Extra 2

c) Analytical treatment for beats

Consider two waves;

$$y_1 = a \sin \left[2\pi \left(n_1 t - \frac{x}{\lambda_1} \right) \right]$$

$$y_2 = a \sin \left[2\pi \left(n_2 t - \frac{x}{\lambda_2} \right) \right]$$

When location is $x=0$

$$y_1 = a \sin 2\pi n_1 t$$

$$y_2 = a \sin 2\pi n_2 t$$

By principle of superposition

$$y = y_1 + y_2 \quad \text{--- (1)}$$

$$= a \sin 2\pi n_1 t + a \sin 2\pi n_2 t$$

$$= a [\sin 2\pi n_1 t + \sin 2\pi n_2 t]$$

$$= a \left[2 \sin 2\pi t \left(\frac{n_1 + n_2}{2} \right) \cos 2\pi t \left(\frac{n_1 - n_2}{2} \right) \right]$$

$$= 2a \sin 2\pi t \left(\frac{n_1 + n_2}{2} \right) \cos \pi t (n_1 - n_2)$$

$$y = 2a \cos \pi t (n_1 - n_2) \sin 2\pi t \left(\frac{n_1 + n_2}{2} \right) \quad \text{--- (2)}$$

$$\text{put } A = 2a \cos \pi t (n_1 - n_2)$$

$$n = \frac{n_1 + n_2}{2}$$

equation becomes

$$y = A \sin 2\pi n t \quad \text{--- (3)}$$

Maximum (waxing) is given by $\rightarrow$

$$A = \pm 2a$$

$$2a \cos \pi t (n_1 - n_2) = \pm 2a$$

$$\cos \pi t (n_1 - n_2) = \pm 1$$

$$\pi t (n_1 - n_2) = \cos^{-1}(\pm 1)$$

$$= 0, \pi, 2\pi, 3\pi, \dots$$

$$\Rightarrow t = 0, \frac{1}{(n_1 - n_2)}, \frac{2}{(n_1 - n_2)}, \frac{3}{(n_1 - n_2)}, \dots$$

$$\text{Time period} = T = \frac{1}{(n_1 - n_2)}$$

$$\text{frequency } f = (n_1 - n_2)$$

minimum (wroning) is given by $\rightarrow$

$$-D = 0$$

$$2a \cos m(n_1 - n_2) = 0$$

$$\cos m(n_1 - n_2) = 0$$

$$m(n_1 - n_2) = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \dots$$

$$t = \frac{1}{2(n_1 - n_2)}, \frac{3}{2(n_1 - n_2)}, \frac{5}{2(n_1 - n_2)}, \dots$$

$$\text{Time period} = \frac{1}{n_1 - n_2}$$

$$\text{frequency} = n_1 - n_2 //$$

d) Consider two collinear oscillations of equal frequency,

$$y_1 = a \sin(\omega t + \phi_1)$$

$$y_2 = b \sin(\omega t + \phi_2)$$

By superposition principle

$$y = y_1 + y_2$$

$$= a \sin(\omega t + \phi_1) + b \sin(\omega t + \phi_2)$$

$$= a [\sin(\omega t + \phi_1) + \sin(\omega t + \phi_2)]$$

$$= a \sin \omega t \cos \phi_1 + a \cos \omega t \sin \phi_1 + b \sin \omega t \cos \phi_2 +$$

$$b \cos \omega t \sin \phi_2$$

$$y = \sin \omega t [a \cos \phi_1 + b \cos \phi_2] + \cos \omega t [a \sin \phi_1 + b \sin \phi_2] \quad (1)$$

$$\text{put } A \cos \theta = a \cos \phi_1 + b \cos \phi_2 \quad (2)$$

$$-A \sin \theta = a \sin \phi_1 + b \sin \phi_2 \quad (3)$$

Equation (1) becomes

$$y = A \sin \omega t \cos \theta + A \cos \omega t \sin \theta$$

$$= A [\sin \omega t \cos \theta + \cos \omega t \sin \theta]$$

$$y = A \sin(\omega t + \theta) \quad (4)$$

Squaring & adding ② & ③

$$A^2 \cdot \cos^2 \theta + A^2 \sin^2 \theta = a^2 \cos^2 \phi_1 + b^2 \cos^2 \phi_2 + 2ab \cos \phi_1 \cos \phi_2 + b^2 \sin^2 \phi_1 + b^2 \sin^2 \phi_2 + 2ab \sin \phi_1 \sin \phi_2$$

$$A^2(1) = a^2(1) + b^2(1) + 2ab[\cos(\phi_1 - \phi_2)]$$

$$A^2 = a^2 + b^2 + 2ab \cos(\phi_1 - \phi_2)$$

dividing ② & ③

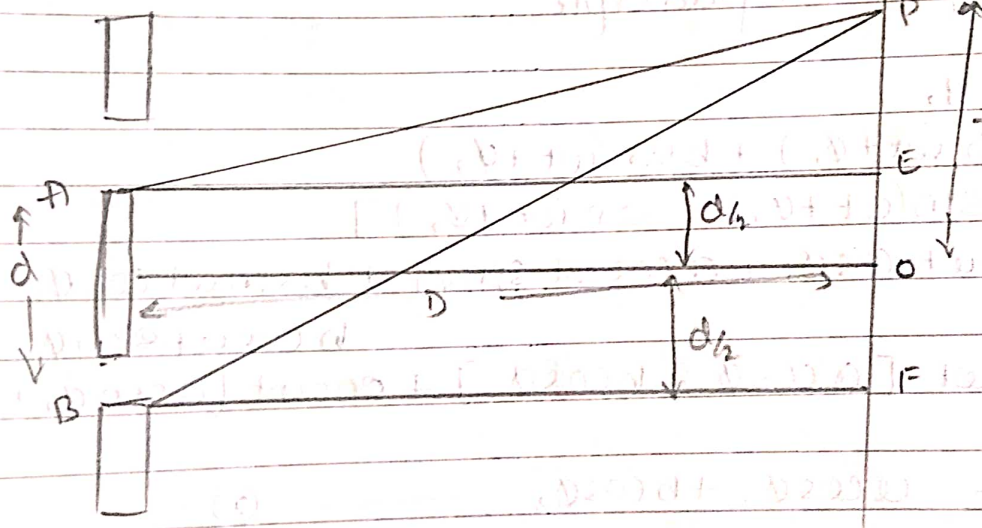
Case:

$$\phi \text{ and } \theta = \frac{a \cos \phi_1 + b \cos \phi_2}{a \sin \phi_1 + b \sin \phi_2}$$

$$\phi_1 - \phi_2 = \theta$$

III

①



Consider two slits of monochromatic sources A & B illuminated by source S. Light emerging from the A & B falls on screen forms bright & dark fringes.

D - Distance between screen & slits
 d - distance between two slits
 x - distance between P & O.

Δ - path difference for bright fringes is $\rightarrow$

$$\Delta = n\lambda$$

$$\Delta = Bp - Ap \quad \text{--- (1)}$$

Δ^{le} BFP

$$Bp^2 = BF^2 + FP^2$$

$$= D^2 + (x + d/2)^2 \quad \text{--- (2)}$$

Δ^{le} AEP

$$Ap^2 = AF^2 + FP^2$$

$$= D^2 + (x - d/2)^2 \quad \text{--- (3)}$$

Subtracting (2) & (3)

$$Bp^2 - Ap^2 = D^2 + x^2 + \frac{d^2}{4} + \frac{2xd}{2} - [D^2 + x^2 + \frac{d^2}{4} - \frac{2xd}{2}]$$

$$Bp^2 - Ap^2 = D^2 + x^2 + \frac{d^2}{4} + xd - D^2 - x^2 - \frac{d^2}{4} + xd$$

$$(Bp - Ap)(Bp + Ap) = 2xd \quad \text{--- (4)}$$

$$Bp + Ap = D \quad \& \quad Bp - Ap = \Delta$$

$$(4) \Rightarrow (D + \Delta) \Delta = 2xd$$

$$2D\Delta = 2xd$$

$$D\Delta = xd$$

$$\Delta = \frac{xd}{D} \quad \text{--- (5)}$$

$$\Delta = n\lambda = \frac{xd}{D}$$

$$x = \frac{Dn\lambda}{d}$$

for n^{th} bright fringe $x_n = \frac{Dn\lambda}{d}$

$$(n+1)^{th} \quad x_{n+1} = \frac{D(n+1)\lambda}{d}$$

$$\text{fringe width} = \beta = x_{n+1} - x_n = \frac{Dn\lambda}{d} + \frac{D\lambda}{d} - \frac{Dn\lambda}{d}$$

$$\boxed{\beta = \frac{D\lambda}{d}}$$

for dark range

$$\beta = \frac{2\lambda}{d}$$

b)

Newton's Corpuscular theory:-

- * Newton's explain theory about particle Nature of wave which is called Corpuscles.
- * Wave is made up of massless particles called Corpuscles.
- * The colour of light waves are different for different size of particles.
- * The speed of light is also increase as the size of particle increase.
- * The theory explain reflection and refraction phenomena.

failures:-

- * Theory gives wrong prediction about speed of light
- * Theory don't explain partial reflection & partial refraction.
- * Theory didn't explain interference, diffraction & polarization of light wave.
- * It gives wrong prediction about colour of

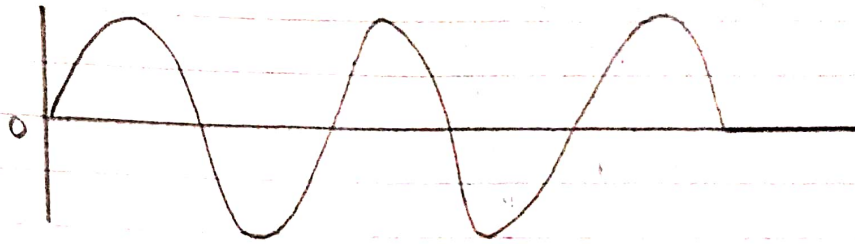
— light wave

* Newton's Theory was failed.

ii

(a)

The intensity of progressive wave is rate of flow of energy.



The potential energy, —

$$d_{\text{up}} = \frac{1}{2} m \omega^2 y^2 \quad \text{--- (1)}$$

The kinetic energy —

$$d_{\text{kin}} = \frac{1}{2} m v^2 \quad \text{--- (2)}$$

The progressive wave equation: $y = a \sin(\omega t - kx)$

$$\text{velocity} = v = \frac{dy}{dt} = a \cos(\omega t - kx) \omega$$
$$= a \omega \cos(\omega t - kx)$$

extra (i) $\therefore d_{\text{up}} = \frac{1}{2} m \omega^2 a^2 \sin^2(\omega t - kx) \quad \text{--- (3)}$

$$d_{\text{kin}} = \frac{1}{2} m a^2 \omega^2 \cos^2(\omega t - kx) \quad \text{--- (4)}$$

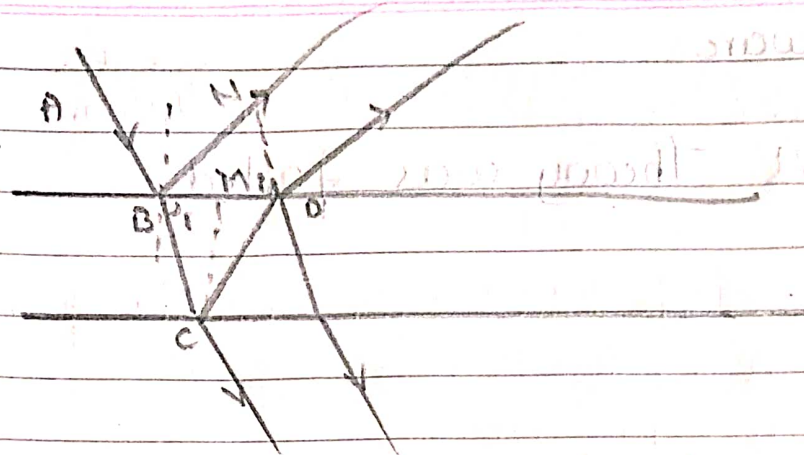
Adding (3) & (4)

$$d_u = d_{\text{up}} + d_{\text{kin}}$$
$$= \frac{1}{2} m a^2 \omega^2 \quad (1)$$

$$d_u = \frac{1}{2} m a^2 \omega^2$$

This is called intensity of progressive wave

iii
©



Path difference $\Delta = n\lambda \Rightarrow (BC + CD)M - BM(C) -$

$$\Delta \text{le BCM} = \boxed{2a \cos \alpha - \frac{\lambda}{2}}$$

$$\sin r = \frac{BM}{BD}$$

$$\cancel{-\lambda \sin r = \frac{BM}{BCM.}}$$

$$\Delta \text{le BND} \quad \sin r = \frac{BN}{BD}$$

$$BN = BD \sin r \Rightarrow (BM + MD) \Rightarrow 2BM.$$

Snell's Law $= BM \sin r$

$$\frac{\sin r}{\sin \alpha} = \mu$$

$$BC = CD$$

$$(1) \Delta = 2BC$$



B. L. D. E. Association's

S. B. ARTS & K. C. P. SCIENCE COLLEGE, VIJAYAPUR

INTERNAL TEST 20 -20

Name / ಹೆಸರು: Sakshi. S. Ajur Roll No./ರೋಲ್ ನಂ: _____ Date / ದಿನಾಂಕ: _____ -20

Subject/ವಿಷಯ: physics (OEC) Semester/ಸೆಮಿಸ್ಟರ್: _____ Exam Seat No / ಪರೀಕ್ಷೆ ಸ್ಥಾನ: U15HM2750005

Invigilator's Signature / ಕನ್ನಡ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ Signature of Evaluator / ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ Marks obtained / ಪಡೆದ ಅಂಕಗಳು

30/30 10/10

1
(a) cloud :- cloud is defined as the aggregation of innumerable water droplets, ice particles or mixture of both in generally much above the ground surface is called cloud.

(c) Wind is defined as movement of air from higher pressure to lower pressure is called wind.

(d) cyclone is defined as the large scale air mass that rotate around the strong centre of low atmospheric pressure and is called cyclone.

II
(a) cyclone :- cyclone is defined as the large scale air mass that rotate around the strong centre of low atmospheric pressure and is called cyclone.

In meteorology cyclone is that blow towards the Northward side.

The cyclonic effect system does not occurred in the Equatorial region because of due to Coriolis force is negligible between the latitudes of 5 degree North and 5 degree South.

Cyclones are take place in the low pressure area. The vulnerability of places the cyclones strikes depends on the topography intensity and boundaries of cyclones.

it is not occurred in the equatorial region of the Earth.

There are 6 factors that holds for the formation of cyclone.

- * a ~~small~~ ample of Amount of temperature at the surface of the sea

- * Instability in the atmosphere

- * Due to high humidity of lower to middle of the troposphere

- * There is a coriolis force that impact on the area so that reason low pressure area is created

- * Different pre-existing - low level

- * factor affecting for the cyclones
- * The temperature of the place

- * The humidity of the place

- * Wind speed

- * The direction of the wind speed

(b). clouds:-

→ tiny cloud is defined as the aggregation of innumerable water droplets or mixture of both ice particles generally at the above the ground surface is called clouds.

* tiny water droplets has the radius of 0.001 cm .

* Nephology is the branch of science it deals with study of clouds is called Nephology

* Meteorology is the branch of science it deals with study of atmosphere of the Earth and weather.

There are 4-types in cloud including

High cloud: → High cloud it is. Mainly cirrus and featuring in structure.

it is about $(40,000 - 20,000) \text{ ft}$ above the ground

(Middle cloud) - Middle cloud it is. alto-cloud. it is about $(20,000 - 7,000) \text{ ft}$ above the ground

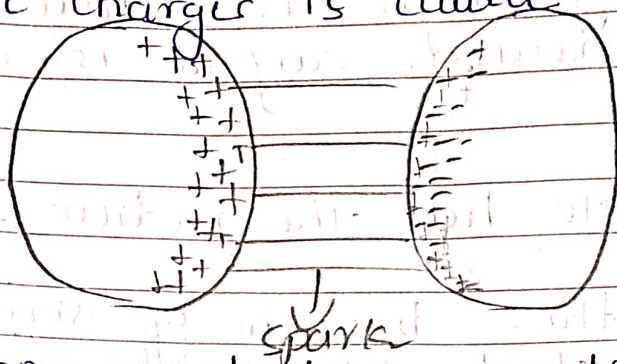
low cloud - it is low cloud. it is shut in structure. it is about to $(below, 7,000) \text{ ft}$ at

cloud. extent various:- it is stratus cloud and it is in heaped structure. it is about to $(20,000 - 7,000 - 20,000) \text{ ft}$ above the ground level

III

①

Electric discharge is defined as the passage of electric current in air due to movement of electric charges is called electric discharge.



Air is non-conductor of electricity. normally air does not conduct the electric current or electric charges.

- * if however, electric charge on two oppositely charged surface is very large in the sparks.
- * Actually, electric energy heats the air in high temperature. so air get glow.
- * The glow of air we can see as flash of light or sparks.

- * If electric charges on two oppositely charged surface is large. insulation bet of the air between them break and electric current pass through it.
- * passage of electric current in air due to movement of electric charges is called electric discharge.
- * In electric discharge, the +ve and -ve charges are cancelled out each other and form thunder storm.

- * In electric discharge, Earth is also produced the thunder followed by the sound of thunder.

- * If two electric charges are cancelled out each other and electric discharge is as thunder storm is produced.

lightning-

* we may see in rainy season, flash of light in cloud in the sky. as followed by the thunder

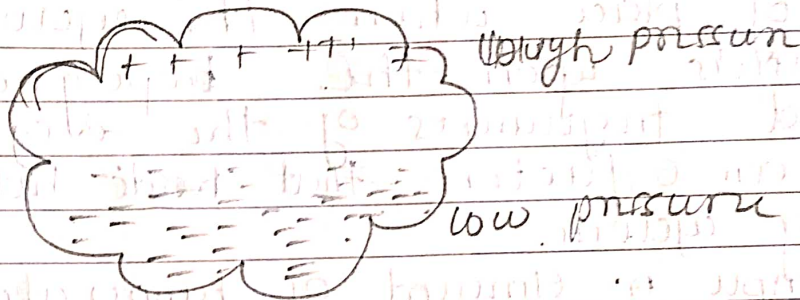
* A bright flash of light we can see in the cloud is called lightning.

* lightning is the great electric current in the sky.

* In electric discharge lighting in the atmosphere between the oppositely charged clouds.

* In electric nature of lightning is established by the scientist of Benjamin Franklin.

* clouds are the aggregation of tiny water droplets



* the positive and -ve clouds are met they produce intense sparks.

* lightning occurs in the cloud in sky is called as cloud lightning.

* somewhere lightning occurs in the between the earth and clouds.

* this it is called as fork lightning.

* storm cloud carries electric discharges.

* if electric discharges from a cloud between extremely lesser than the the tremendous electric charges present on the bottom of the cloud suddenly flow to the roof of the building and lightning is coming towards the building

b) cyclone *

cyclone is defined as the larger scale air mass that rotate around the strong centre of low atmospheric pressure is called cyclones.

cyclonic system are not formed in the Equatorial part of the Earth. because of reason that Coriolis force is negligible between the latitudes of 5° north and 5° south.

cyclones are take place in the low pressure area. the vulnerability of place where the cyclone strikes depends upon the topography intensity and frequency of the cyclone.

There are 6 factors that hold the formation of cyclone

* Air Temp & Amount of temperature at the surface of the sea

* instability of in the atmosphere

* There is an extra Coriolis force that impact on the area so that the low pressure area is created

* There is an different pre-existing low wind due to high humidity of water to middle of the troposphere

Name/ಹೆಸರು: Prerna S. Patil Roll No./ಸ್ಥಳಾಂಕ: 153 Date/ದಿನಾಂಕ: 01/01/2024Subject/ವಿಷಯ: Physics-I Semester/ಸೆಮಿಸ್ಟರ್: V Exam Seat No / ಪರೀಕ್ಷೆ ಸ್ಥಳಾಂಕ: 015KIM2150177

Invigilator's Signature / ಕೋಶದ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ Signature of Evaluator / ಪರೀಕ್ಷಕರ ಸಹಿ Marks obtained/ ಪಡೆದ ಅಂಕಗಳು

30/30

I.

a. Inertial frame of reference.

A frame of reference involves laws of motion holds good. A frame of reference either at rest or motion or moving with constant velocity is Inertial frame of reference.

non-Inertial frame of reference

A frame of reference of laws of motion not valid. non-inertial frame of reference accelerated frame of reference
 $F \neq ma$

b. Conservative force is work done by its moving particle from one point to the another point of space and does not depends on actual path followed by particle and depends on initial and final position of the points.

c. When a light or electromagnetic radiation (UV ray, X-ray) falls on metal surface it emits electrons. the process of emission of electron from a metal surface. It is illuminated by suitable wavelength is known as photoelectric effect.

d. When a monochromatic beam of high frequency radiations scattered on substance the scattered substance have two components one is higher wavelength is known as modified wavelength and another one is

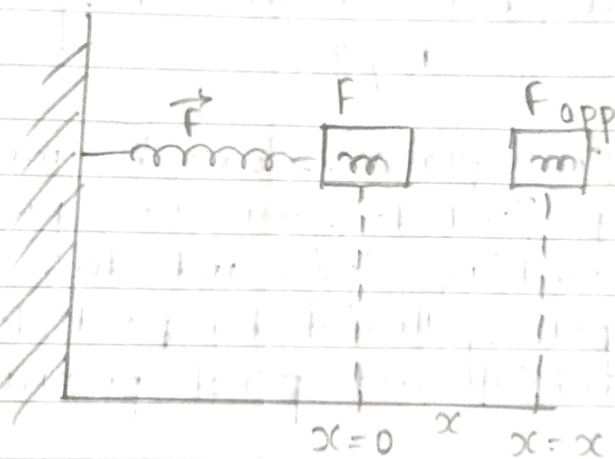
Same wavelength is known as unmodified wavelength is known as Compton effect

II.

c). Consider the linear harmonic Oscillator. Consist of a particle acted upon a particle whose magnitude changes linearly with distance 'x' from it's mean position.

A Simple pendulum Oscillates a Straight line of a fixed point is known as mean position.

A restoring force considered as a Conservative force.



A restoring force considered as a Conservative force is given by

$$F \propto x \quad [\therefore \text{Hooke's law}]$$

$$F = -kx \quad \text{--- (1)}$$

The Kinetic Energy of the particle is given

$$\text{by } T = \frac{1}{2} mv^2$$

$$T = \frac{1}{2} mv^2 \quad \text{and } v = x = \frac{dx}{dt}$$

$$T = \frac{1}{2} m \dot{x}^2 \quad \text{--- (2)}$$

The restoring force is a conservative force can be represented by

$$F = -\frac{dV}{dx}$$

$$dV = -F dx$$

$$dV = -(Kx) dx$$

Integrating on both side

$$\int dV = \int -(Kx) dx$$

$$V = \frac{Kx^2}{2} \quad \text{--- (3)}$$

$$\text{Lagrangian Linear} = T - V$$

Substitute the Eqⁿ (2) and Eqⁿ (3)

$$L = \frac{1}{2} m \dot{x}^2 - \frac{Kx^2}{2} \quad \text{--- (4)}$$

Partially Differentiate eqⁿ (4) with respect to $\dot{x}$

$$\frac{\partial L}{\partial \dot{x}} = \frac{1}{2} m \dot{x}$$

$$\frac{\partial L}{\partial \dot{x}} = m \dot{x} \quad \text{--- (5)}$$

Partially D. Eqⁿ (4) with respect to x

$$\frac{\partial L}{\partial x} = -\frac{Kx}{2}$$

$$\frac{\partial L}{\partial x} = -Kx \quad \text{--- (6)}$$

Lagrangian Linear Eqⁿ is given by

$$\frac{d}{dt} \left[\frac{\partial L}{\partial \dot{x}} - \frac{\partial L}{\partial x} \right] = 0 \quad \text{--- (7)}$$

Add Eqⁿ (4) & (5) & (6)

$$\frac{d}{dt} \left[\frac{\partial L}{\partial \dot{x}} - \frac{\partial L}{\partial x} \right] = 0$$

$$\frac{d}{dt} [m \dot{x} - (-Kx)]$$



B. L. D. E. Association's

S. B. ARTS & K. C. P. SCIENCE COLLEGE, VIJAYAPUR

Name / ಹೆಸರು: First INTERNAL TEST 2023 -2024

Subject/ವಿಷಯ: Savita, Biligadur Roll No./ಸ್ಥಳಾಂಕ: 186 Date/ದಿನಾಂಕ 06-01-2024

Subject/ವಿಷಯ: Physics - II Semester/ಸೆಮಿಸ್ಟರ್: V Exam Seat No / ಪರೀಕ್ಷೆ ಸ್ಥಳಾಂಕ: U15KM2150366

Invigilator's Signature / ಕೋರದಿ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ Signature of Evaluator / ಪರೀಕ್ಷಕರ ಸಹಿ Marks obtained / ಪಡೆದ ಅಂಕಗಳು

Q. No I.

a) Spatial Quantization :- it is the process of method of orientation of orbits in a space.

* According to this the size and shape of the orbits are Quantised.

✓ it is explained by Bohr's, Sommerfeld's theory.

b) Electron spin hypothesis :- it is the process that which electron spin around its own plane along with revolving around the nucleus of an atom.

* This hypothesis is explained by two Dutch physicist Goudsmith & Uhenbeck.

c) Selection rule for rotation spectrum.

$$\Delta J = \pm 1$$

+1 is for the absorption

-1 is for emission.

d) Scattering of light :- The phenomenon of absorption and emission of light beam (radiation) by atoms and molecules in the atmosphere called Scattering of light.

Type.

i) Coherent Scattering

ii) Non Coherent Scattering.

Q. No II

a) Quantum numbers associated with vector atom model.

→ There are 5 quantum numbers that associated with model.

i) Principal Quantum number (n)

* this number helps to determine the total energy of electron in atom and average distance of electron from the nucleus.

* it is designated by n.

* the principal quantum numbers are 1, 2, 3, ... so on.

* The orbits are designated by K, L, M, N, ...

* if the value of n is increased then the energy of e^- is also increased.

* Maximum no of electron in each shell is $2n^2 = 2, 8, 18, 32, \dots$

ii) Orbital Quantum number (l)

* it helps to determine the orbital angular momentum of the electron. This is denoted by l.

* The Magnitude of orbital quantum number is represented as $|l| = \sqrt{l(l+1)} \hbar$
 $\hbar = \frac{h}{2\pi}$

* The orbital quantum numbers are $l = 0, 1, 2, 3, \dots$

* The orbits are designated by s, p, d, f, ...

* Maximum no of electron in each Subshell is given by $l = (n-1) //$

iii) Spin Quantum number (s)

* Spin quantum number helps to determine the state of an atom.

* Spin quantum no is not just a quantum it is relativistic property of electron.

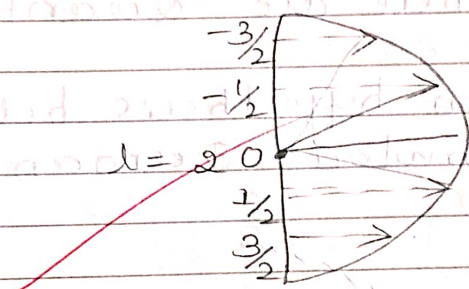
- * Spin Quantum number determine the intrinsic angular momentum of electron.
- * it is denoted by S .

The value of S is always $1/2$.

(iv) Magnetic orbital Quantum number (m_l)

- * The projection of orbital Quantum number along the direction of magnetic field called magnetic orbital Quantum number.
- * This helps determine the exact orientation of plane of orbit in space.
- * This angular momentum of orbit is due to the spin and orbital motion of electron.
- * Magnetic field orbit orients in the direction of field applied.
- * field orbit is discrete and few take some permissible values.
- * The magnetic orbit m_l is represented as the $m_l = 2l + 1$.

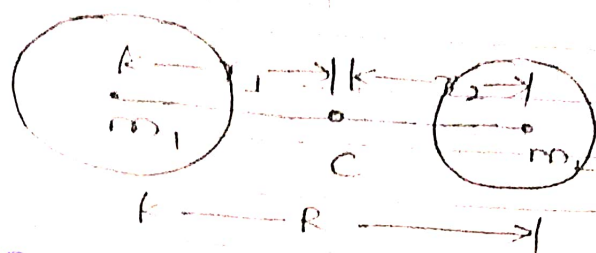
v) ~~for~~



v) Magnetic Spin Quantum number

- * The projection of Spin Quantum number along the direction of magnetic field when the external Magnetic field is applied.
- * The field applied S can be parallel or antiparallel to the field so it can take values only $+\frac{1}{2}$ and $-\frac{1}{2}$.

Q. No III



Consider a diatomic molecule consist of two atoms of having mass m_1 & m_2 . the two atoms are separated by the bond distance $R = r_1 + r_2$.

r_1 & r_2 are distance of mass m_1 & m_2 of the particle from the true centre C .

The force applied end over end of the molecule so it is defined by moment of inertia $I = m_1 r_1^2 + m_2 r_2^2$. — (1)

if the system is balanced at the true centre 'C' then $m_1 r_1 = m_2 r_2$ — (2)

then eqⁿ (1) can be written as

$$I = m_1 r_1^2 + m_2 r_2^2$$

$$I = r_1 r_2 (m_1 + m_2)$$

W.K.T

$$R = r_1 + r_2$$

$$r_1 = R - r_2$$

$$r_2 = R - r_1$$

Substitute these values in eqⁿ (2)

$$m_1 r_1 = m_2 (R - r_1)$$

$$m_1 r_1 = m_2 R - m_2 r_1$$

$$m_1 r_1 + m_2 r_1 = m_2 R$$

$$r_1 (m_1 + m_2) = m_2 R$$

$$r_1 = \frac{m_2 R}{m_1 + m_2} \quad \text{--- (3)}$$

Similarly

$$r_2 = \frac{m_1 R}{m_1 + m_2} \quad \text{--- (4)}$$

Substitute eqⁿ (3) & (4) in eqⁿ (1)

$$I = m_1 \left(\frac{m_2 R}{m_1 + m_2} \right)^2 + m_2 \left(\frac{m_1 R}{m_1 + m_2} \right)^2$$

$$I = R^2 m_1 m_2 \left(\frac{m_1 + m_2}{(m_1 + m_2)^2} \right)$$

$$I = R \frac{m_1 m_2}{m_1 + m_2}$$

$$\mu = \frac{m_1 m_2}{m_1 + m_2}$$

→ μ is the reduced mass.
K.E due to rotation of particle

$$K.E = \frac{1}{2} I \omega^2 \quad \text{--- (5)}$$

Angular momentum of particle

$$L = I \omega \quad \text{---}$$

Substitute value of ω in eqⁿ (5)

$$E = \frac{L^2}{2I}$$

The angular momentum of the particle is quantised.

$$L = \sqrt{J(J+1)} \frac{h}{2\pi}$$

$$\Rightarrow E = \frac{J(J+1) h^2}{8\pi^2 I} \cdot \frac{1}{2I}$$

Energy of molecule in joule.
in order to convert it into energy
joule to wave divide energy by hc

$$\frac{E}{hc} = \frac{J(J+1) h^2}{8\pi^2 I c}$$

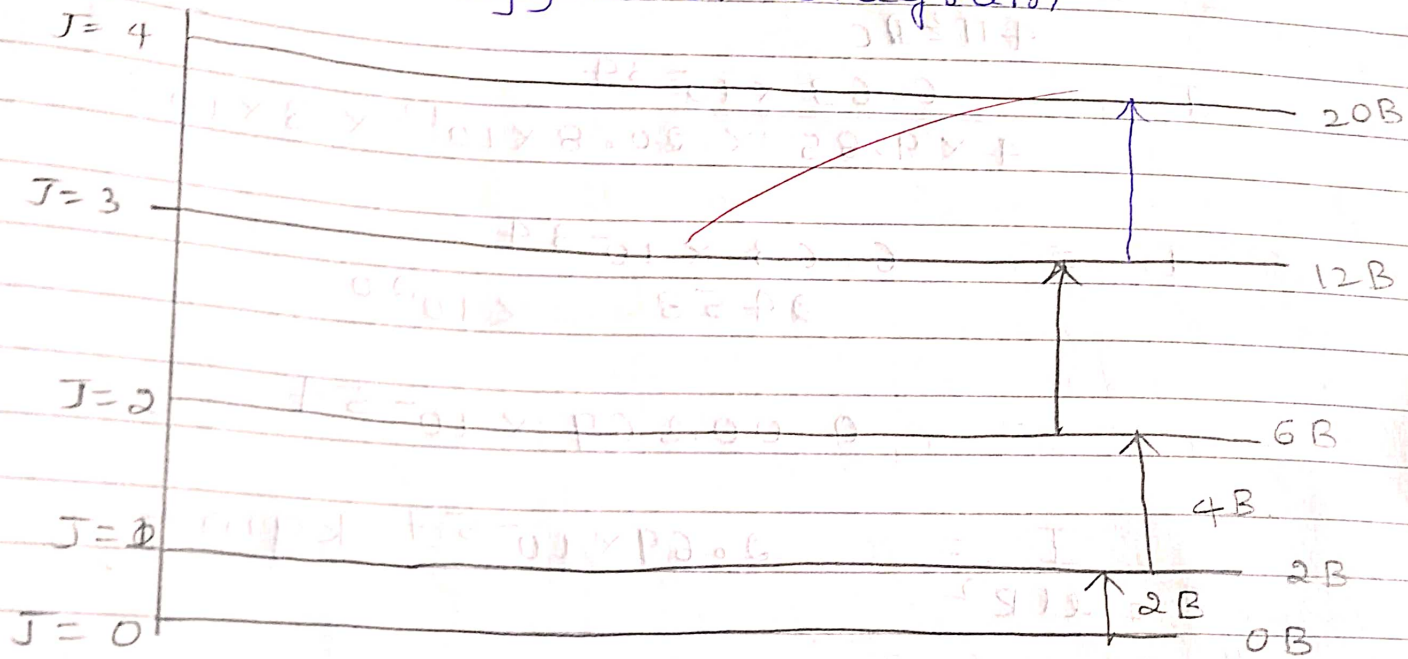
$$\bar{\nu} = \frac{J(J+1) h}{8\pi^2 I c}$$

$$\bar{\nu} = J(J+1) \cdot B$$

B is rotational constant

$$\begin{array}{lcl}
 J=0 & \sqrt{J(J+1)} & = 0B \\
 J=1 & \sqrt{J(J+1)} & = 2B \\
 J=2 & \sqrt{J(J+1)} & = 6B \\
 J=3 & \sqrt{J(J+1)} & = 12B
 \end{array}$$

Energy level Diagram



2 d)

$$\Delta T = 20.8 \times 10^{12}$$

$$\mu = 1.66 \times 10^{-27}$$

$$I = ?$$

$$R = ?$$

$$I = \frac{h}{4\pi^2 \mu c}$$

$$I = \frac{6.63 \times 10^{-34}}{4 \times 9.85 \times 20.8 \times 10^{12} \times 3 \times 10^8}$$

$$I = \frac{6.63 \times 10^{-34}}{3458 \times 10^{20}}$$

$$= 0.00269 \times 10^{-54}$$

$$I = 2.69 \times 10^{-57} \text{ kgm}^2$$

$$I = \mu R^2$$

$$R =$$

$$= \sqrt{\frac{I}{\mu}}$$

$$= \sqrt{\frac{2.69 \times 10^{-57}}{1.66 \times 10^{-27}}}$$

$$= \sqrt{\frac{1.66 \times 10^{-29}}{10^{-14}}}$$

$$= \sqrt{1.66 \times 10^{-15}} \text{ m}$$

$$R = 1.28 \times 10^{-15} \text{ m}$$

Moment of inertia $I = 2.69 \times 10^{-57} \text{ kgm}^2$
bond distance $R = 1.28 \times 10^{-15} \text{ m}$



B. L. D. E. Association's

S. B. ARTS & K. C. P. SCIENCE COLLEGE, VIJAYAPUR

IInd

INTERNAL TEST 2023 -2024

Name / ಹೆಸರು : Tabassum. M.B

Roll No./ಸ್ಥಳಾಂಕ : 318

Date / ದಿನಾಂಕ : 10-1-2024

Subject/ವಿಷಯ : Physics

Semester/ಸೆಮಿಸ್ಟರ್ : Ist

Exam Seat No / ಪರೀಕ್ಷೆ ಸ್ಥಳಾಂಕ : U15KM2350379

Invigilator's Signature / ಕೊಠಡಿ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ

Signature of Evaluator / ಪರೀಕ್ಷಕರ ಸಹಿ

Marks obtained / ಪಡೆದ ಅಂಕಗಳು

29/30

Q No. I

c) Aphelion :- The large distance of planet from the Sun about which it revolves

Perihelion :- The Smallest distance of planet from the Sun about which it revolves.

d) Hooke's Law :- Hooke's law states that Stress is directly proportional to strain within the elastic limit.

Or in other words stretch of a spring is directly proportional to the Applied force

$$F \propto X$$
$$F = KX$$

Where F is the force

K is constant

X is stretch

e) Types of 'elastic constants'

i) Young's modulus :- The ratio of Normal Stress to the linear strain is called Young's modulus.

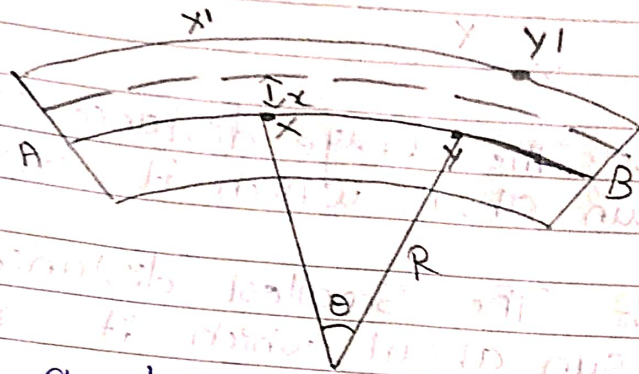
ii) Bulk modulus :- The ratio of Normal Stress to the volumetric strain is called Bulk modulus

iii) Rigidity modulus :- The ratio of tangential stress to the shearing strain is called Rigidity modulus

Q No. II

c) Bending moment

Q



Consider a beam under the action of the forces due to the property of elasticity of materials a restoring force acts on the beam. In equilibrium position bending moment is equal to the restoring moment. The moment of restoring couple is called bending moment.

Consider a beam $X'Y'$ at a distance x from the neutral axis
 $XY = RO$
 $X'Y' = (R+x)\theta$

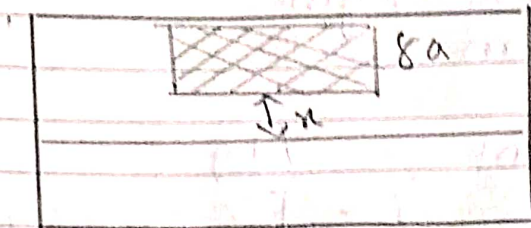
$$\begin{aligned} \text{Increase in length} &= X'Y' - XY \\ &= (R+x)\theta - RO \\ &= RO + x\theta - RO \\ &= x\theta \end{aligned}$$

$$\text{Strain} = \frac{x\theta}{RO} = \frac{x}{R} \quad \text{--- (1)}$$

$$\text{Young's modulus} = \frac{\text{Stress}}{\text{Strain}}$$

$$\text{stress} = \gamma \times \text{Strain}$$

$$= \gamma \cdot \frac{x}{R} \quad \text{--- (2)}$$



Consider a small element of cross sectional area δa at a distance x above the neutral axis

The force acting on the element of area of cross section δa is given by

$$F = \text{stress} \times \text{area}$$

$$= \left(\gamma \cdot \frac{x}{R} \right) \cdot \delta a$$

The moment of force about neutral axis = force $\times$ perpendicular distance

$$= \left(\gamma \cdot \frac{x}{R} \right) \delta a \cdot x$$

$$= \frac{\gamma x^2}{R} \cdot \delta a$$

Total moment of force about the neutral axis is given by

$$= \sum \frac{\gamma x^2}{R} \cdot \delta a$$

$$= \frac{\gamma}{R} \sum x^2 \cdot \delta a$$

$$\text{here } \sum x^2 \cdot \delta a = I_{xx} = I_g$$

$$\therefore \text{bending moment} = \frac{\gamma I_g}{R}$$

$$\boxed{\text{Bending moment} = \frac{\gamma I_g}{R}}$$

This is the expression for bending moment

d)

Given

$$\begin{aligned} Y &= 20 \times 10^{10} \text{ Nm}^{-2} \\ \frac{I_g}{R} &= 4 \times 10^{-3} \text{ kgm}^3 \\ R &= 2 \text{ m} \end{aligned}$$

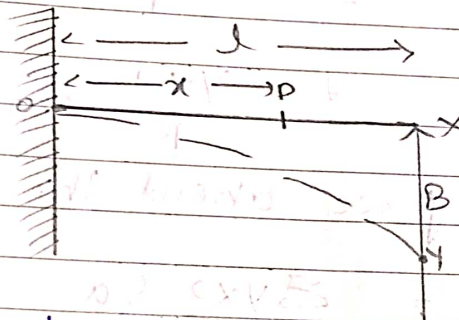
$$\begin{aligned} \text{bending moment} &= \frac{Y I_g}{R} \\ &= \frac{20 \times 10^{10} \times 4 \times 10^{-3}}{2} \\ &= \frac{80 \times 10^7}{2} \end{aligned}$$

$$= 40 \times 10^7 \text{ Nm}^2$$

Q No III

c)

A cantilever is a beam fixed horizontally at one end and loaded by another



Let OX be a beam of length ' l ' fixed horizontally at ' O ' and loaded by weight w at X . The bent position is shown by the dotted line.

consider a section P at a distance x from the fixed point ' O '. Since the beam is in equilibrium in the bent position the external bending couple is balanced by the internal bending moment.

$$\frac{\gamma I_g}{R} = W (1-x)$$

$$\frac{1}{R} = \frac{W (1-x)}{\gamma I_g} \quad \text{--- (1)}$$

If y is the depression then Radius of curvature R of the section p is given by

$$\frac{1}{R} = \frac{\frac{d^2y}{dx^2}}{1 + \left(\frac{dy}{dx}\right)^2} \quad \text{--- (2)}$$

$\frac{dy}{dx}$ = Slope of tangent, since the depression

is very small $\frac{dy}{dx}$ is also small so it can be neglected then Equation (2) becomes

$$\frac{1}{R} = \frac{d^2y}{dx^2} \quad \text{--- (3)}$$

comparing equation (1) & (3) we get

$$\frac{d^2y}{dx^2} = \frac{W (1-x)}{\gamma I_g}$$

Integrating on both sides we get

$$\int \frac{d^2y}{dx^2} = \frac{W}{\gamma I_g} \int (1-x) \cdot dx$$

$$\frac{dy}{dx} = \frac{W}{\gamma I_g} \left[x - \frac{x^2}{2} \right] + C_1 \quad \text{--- (5)}$$

C_1 being the integration constant, $\frac{dy}{dx} = 0 \Rightarrow$

Equation (5) can be re-written as

$$\frac{dy}{dx} = \frac{W}{\gamma I_g} \left[x - \frac{x^2}{2} \right]$$

Again integrating we get

$$\int \frac{dy}{dx} = \frac{W}{Y I_g} \int \left(lx - \frac{x^2}{2} \right) dx$$

$$y = \frac{W}{Y I_g} \left[\frac{lx^2}{2} - \frac{x^3}{6} \right] + C_2 \quad \text{--- (6)}$$

C_2 is the integration constant, $\frac{dy}{dx} = 0 \Rightarrow C_2 = 0$
So, Equation (6) can be re-written as

$$y = \frac{W}{Y I_g} \left[\frac{lx^2}{2} - \frac{x^3}{6} \right] \quad \text{--- (7)}$$

This is the depression produced
At the free end $x = l$

$$y_0 = \frac{W}{Y I_g} \left[\frac{l^3}{2} - \frac{l^3}{6} \right]$$

$$y_0 = \frac{W}{Y I_g} \left[\frac{2l^3}{3} - \frac{l^3}{6} \right]$$

$$y_0 = \frac{W l^3}{3 Y I_g}$$

Case i) For rectangular cross section
of breadth 'b' and thickness 'd'

$$A = b \times d$$

$$k^2 = \frac{bd^2}{12}$$

$$I_g = A k^2$$

$$A k^2 = b \times d \cdot \frac{bd^2}{12}$$

$$= \frac{bd^3}{12}$$

$$\gamma_0 = \frac{W l^3}{3 \gamma \left(\frac{b d^3}{12} \right)}$$

$$\gamma_0 = \frac{4 W l^3}{3 \gamma b d^3}$$

$$\gamma_0 = \frac{4 W l^3}{b d^3}$$

ii) For circular cross-section

$$I_{xx} = \frac{\pi r^4}{4} = I_y$$

$$\gamma_0 = \frac{W l^3}{3 \gamma \left(\frac{\pi r^4}{4} \right)}$$

$$\gamma_0 = \frac{4 W l^3}{3 \gamma \pi r^4}$$

d) Given

$$l = 1 \text{ m}$$

$$b = 0.03 \text{ m}$$

$$d = 2.5 \text{ mm} = 2.5 \times 10^{-3} \text{ m}$$

$$W = 2.5 \text{ kg} = 2.5 \times 10^{-3} \text{ g}$$

$$\gamma = \frac{4 W l^3}{b d^3}$$

$$= \frac{4 \times (2.5 \times 10^{-3}) (1)^3}{0.03 \times (2.5 \times 10^{-3})^3}$$

$$= \frac{10 \times 10^{-3}}{0.075 \times 10^{-9}}$$

$$= \frac{10 \times 10^{-3}}{0.03 \times (15.625 \times 10^{-9})}$$

$$= \frac{10 \times 10^{-3}}{0.46875 \times 10^{-9}}$$

$$= \frac{10 \times 10^{-3}}{0.46875 \times 10^{-9}}$$

$$= \underline{21.33 \times 10^6} \text{ Nm}^{-2}$$

No. 1
by

Kepler's 2nd law of planetary motion states that "The radius vector drawn from Sun to planet sweeps equal areas in equal intervals of time."

Kepler's third law states that "square of time period of revolution of planet around the Sun is directly proportional to the cube of semi ~~axis~~ major axis

$$T^2 \propto a^3$$



B. L. D. E. Association's

S. B. ARTS & K. C. P. SCIENCE COLLEGE, VIJAYAPUR

II

INTERNAL TEST 2023 -2024

Name / ಹೆಸರು: Bhoomika M. Kondaguli Roll No./ಸ್ಥಳಾಂಕ: 001 Date/ದಿನಾಂಕ: 12-02-2024Subject/ವಿಷಯ: Physics Semester/ಸೆಮಿಸ್ಟರ್: III Exam Seat No / ಪರೀಕ್ಷೆ ಸ್ಥಳಾಂಕ: U15KM2250180

Invigilator's Signature / ಕೋರಣ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ Signature of Evaluator / ಪರೀಕ್ಷಕರ ಸಹಿ

Marks obtained / ಪಡೆದ ಅಂಕಗಳು

30

10

10

Q.no I >

Ans-a) When two waves having almost similar frequency, wavelength, amplitude collide with each other in the opposite orientations, then they form the standing waves.

Ans-b) The amount of energy stored per unit volume of an object is called as energy density.
Energy density, $E = \frac{1}{2} \omega^2 a^2 \rho \cdot dx$.

Ans-c) The process of bending of light around the edges of an obstacle is called as the diffraction.

Q.no. II >

Ans-a) We know that, plane progressive wave Eqⁿ
 $y = a \sin \frac{2\pi}{\lambda} (vt - x)$ where a = amplitude

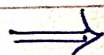
The differential wave equation is -
 $\frac{d^2 y}{dt^2} = v^2 \frac{d^2 y}{dx^2}$

The general solution is given by -
 $y = f_1(vt - x) + f_2(vt + x)$

Now, two wave equations are -

$$y_1 = a \sin \frac{2\pi}{\lambda} (vt - x)$$

$$y_2 = a' \sin \frac{2\pi}{\lambda} (vt + x)$$



By the superposition of wave-

$$y = y_1 + y_2$$

$$y = a \sin \frac{2\pi}{\lambda} (vt - x) + a' \sin \frac{2\pi}{\lambda} (vt + x) \quad \rightarrow \textcircled{1}$$

At the boundary conditions,

$$x = 0, y = 0$$

$$0 = a \sin \frac{2\pi}{\lambda} (vt) + a' \sin \frac{2\pi}{\lambda} (vt)$$

$$0 = \sin \frac{2\pi}{\lambda} (vt) (a + a')$$

$$a + a' = 0$$

$$a = -a' \Rightarrow a' = -a$$

put $a = -a'$ in equation - $\textcircled{1}$ -

$$y = a \sin \frac{2\pi}{\lambda} (vt - x) - a \sin \frac{2\pi}{\lambda} (vt + x)$$

$$y = a \left[\sin \frac{2\pi}{\lambda} (vt - x) - \sin \frac{2\pi}{\lambda} (vt + x) \right]$$

By using, $\sin C - \sin D = 2 \sin \left(\frac{C-D}{2} \right) \cos \left(\frac{C+D}{2} \right)$

$$y = 2a \left[\sin \frac{2\pi}{\lambda} \left(\frac{vt - x - vt - x}{2} \right) \cos \frac{2\pi}{\lambda} \left(\frac{vt - x + vt + x}{2} \right) \right]$$

$$y = -2a \left[\sin \frac{2\pi x}{\lambda} \cos \frac{2\pi vt}{\lambda} \right]$$

put $y = 0, x = l$.

$$y = -2a \left[\sin \frac{2\pi l}{\lambda} \cos \frac{2\pi vt}{\lambda} \right]$$

$$\sin \frac{2\pi l}{\lambda} = 0$$

$$\frac{2\pi l}{\lambda} = 0, \pi, 2\pi, \dots, p\pi$$

$$p = 0, 1, 2, \dots$$

$$\frac{2\pi l}{\lambda} = p\pi$$

$$\lambda = \frac{2l}{p}$$

$$f = \frac{v}{\lambda}$$

$$\Rightarrow \left\{ f = \frac{p}{2l} \sqrt{\frac{T}{\rho}} \right\}$$

$f = \text{frequency}$

$\Rightarrow$

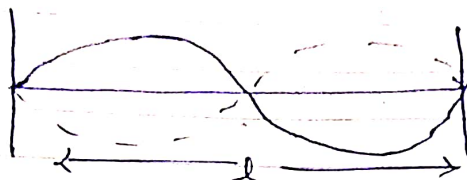


$$p=1$$

$$f = \frac{1}{2l} \sqrt{\frac{T}{\mu}}$$

First Harmonic frequency

$$l = \lambda/2$$



$$p=2$$

$$f = \frac{2}{2l} \sqrt{\frac{T}{\mu}}$$

Second Harmonic frequency

$$l = \lambda$$



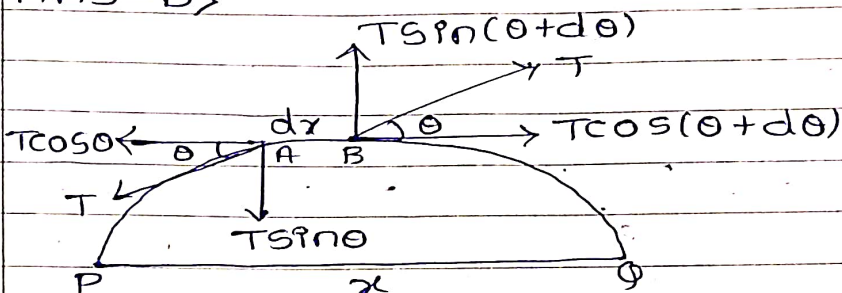
$$p=3$$

$$f = \frac{3}{2l} \sqrt{\frac{T}{\mu}}$$

Third Harmonic frequency

$$l = \frac{3\lambda}{2}$$

Ans-b)



$$R_H = T \cos(\theta + d\theta) - T \cos \theta$$

$$R_V = T \sin(\theta + d\theta) - T \sin \theta$$

T = Tension on the string

$$F = ma$$

$$F = m \frac{d^2 y}{dt^2}$$

$$\mu = \frac{m}{dx} \Rightarrow m = \mu dx$$

$$F = \mu dx \frac{d^2 y}{dt^2}$$

$$F = R_V$$

$$T \sin(\theta + d\theta) - T \sin \theta = \mu dx \frac{d^2 y}{dt^2}$$

$$\sin \theta / \cos \theta = \tan \theta, \cos \theta \approx 1$$

$$\sin \theta = \tan \theta$$

$$T \tan(\theta + d\theta) - T \tan \theta = \int dx \frac{d^2 y}{dt^2}$$

$$T (\text{change in gradient}) = \int dx \frac{d^2 y}{dt^2}$$

$$T \left[d \frac{dy}{dx} \right] = \int dx \frac{d^2 y}{dt^2}$$

$$T \cdot d \frac{dy}{dx} \cdot \frac{dx}{dx} = \int dx \frac{d^2 y}{dt^2}$$

$$T \frac{d^2 y}{dx^2} \cdot dx = \int dx \frac{d^2 y}{dt^2}$$

$$T \frac{d^2 y}{dx^2} = \int \frac{d^2 y}{dt^2}$$

$$\frac{d^2 y}{dt^2} = \frac{T}{\int} \frac{d^2 y}{dx^2}$$

Comparing it with differential wave eqⁿ

$$\frac{d^2 y}{dt^2} = v^2 \frac{d^2 y}{dx^2}$$

$$v^2 = \frac{T}{\int}$$

$$v = \sqrt{\frac{T}{\int}}$$

v = velocity of transverse wave

T = tension on string

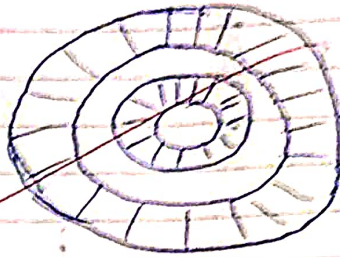
$\int$ = density of string

Q. No. III)

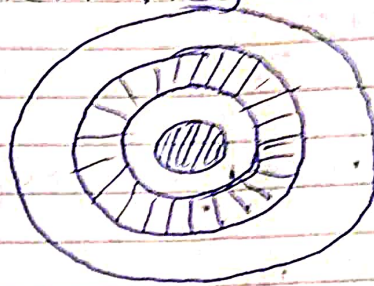
Ans- a) Zone plate is the specially constructed diffraction screen in the form of transparent glass plate, such that light from alternate zones are cut off.

- Fresnel divides the plane wavefront into small concentric zones called as half period zone because the path difference b/w each zone is $\lambda/2$.
- The radius ratio of these zones are - $\sqrt{1} : \sqrt{2} : \sqrt{3} : \dots : \sqrt{n}$ $\Rightarrow$

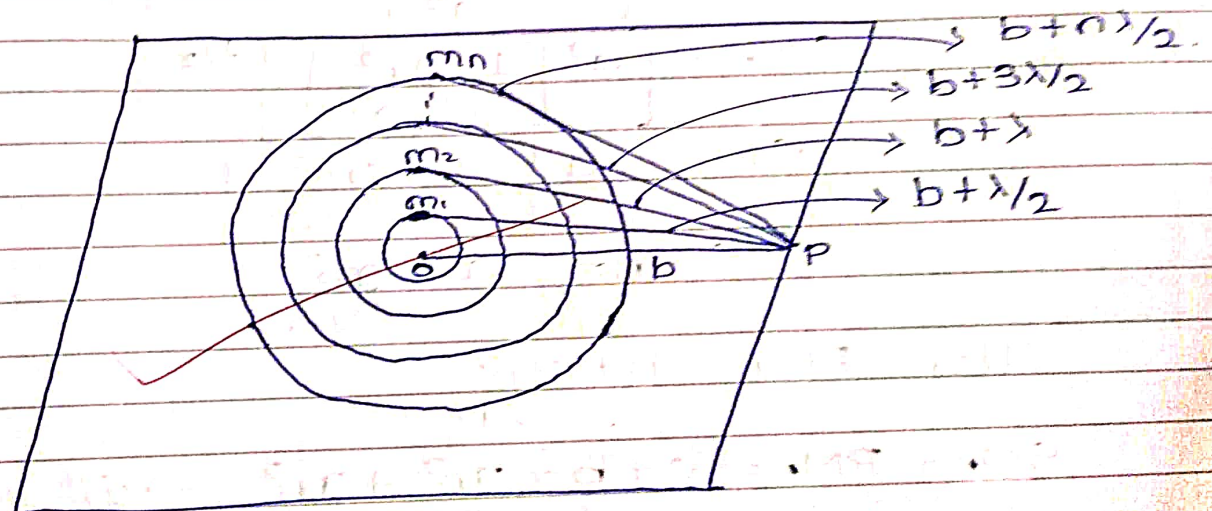
- The area of each zone is same.
- These zones exhibit the rectilinear propagation of light waves.
- When even number of zone plates are blocked then positive zone plate is formed.

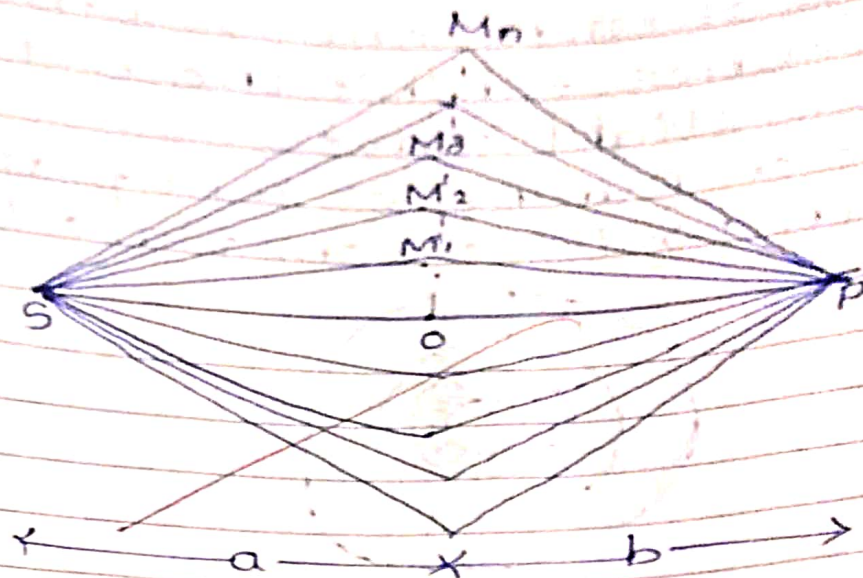


- When odd number of zone plates are blocked then negative zone plate is formed.



• Zone plate:





$$SO + OP = (a + b) + \frac{\lambda}{2}$$

$$SM_1 + M_1P = (a + b) + \frac{2\lambda}{2}$$

$$SM_n + M_nP = (a + b) + \frac{n\lambda}{2} \rightarrow \textcircled{1}$$

right angle

In $\triangle SOM_n$,

$$SM_n^2 = SO^2 + OM_n^2$$

$$SM_n^2 = a^2 + r_n^2$$

$$SM_n^2 = a^2 \left[1 + \frac{r_n^2}{a^2} \right]$$

$$SM_n = \left[a^2 \left[1 + \frac{r_n^2}{a^2} \right] \right]^{1/2}$$

$$SM_n = a \left[\frac{1 + \frac{r_n^2}{a^2}}{2} \right]$$

$$SM_n = a + \frac{r_n^2}{2a}$$

$$\text{Similarly, } PM_n = b + \frac{r_n^2}{2b}$$

$$SM_n + PM_n = a + b + \frac{r_n^2}{2b} + \frac{r_n^2}{2a} \rightarrow \textcircled{2}$$

$\Rightarrow$

From ① and ② -
$$a + b + \frac{r_n^2}{2b} + \frac{r_n^2}{2a} = a + b + \frac{n\lambda}{2}$$

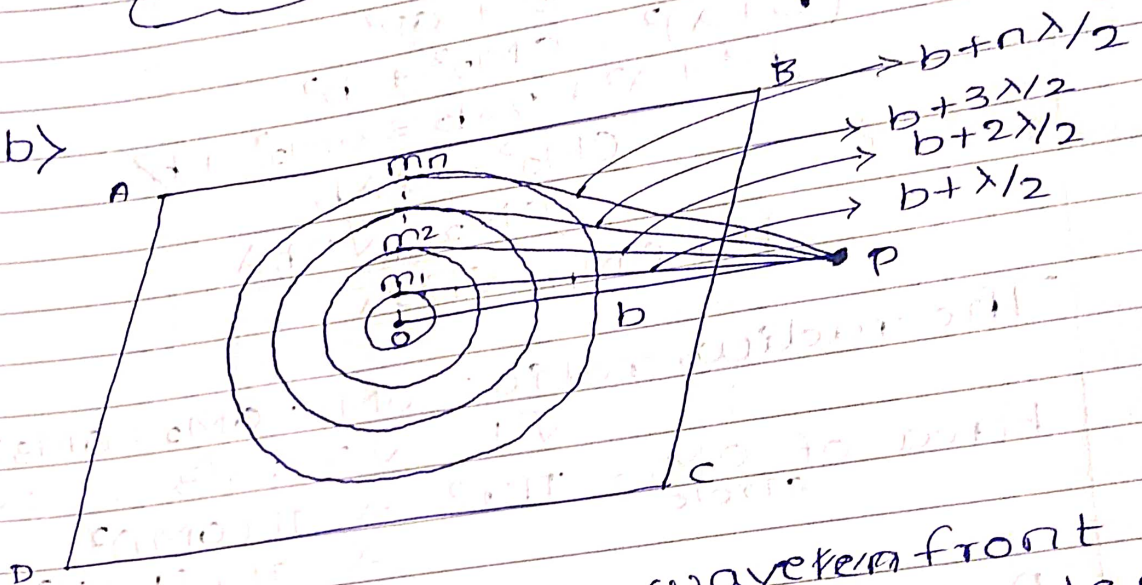
$$\frac{r_n^2}{2} \left[\frac{1}{a} + \frac{1}{b} \right] = \frac{n\lambda}{2}$$

$$\frac{r_n^2}{2} \left[\frac{a+b}{ab} \right] = \frac{n\lambda}{2}$$

$$r_n^2 = n\lambda \left(\frac{ab}{a+b} \right)$$

$$r_n = \sqrt{n\lambda \left(\frac{ab}{a+b} \right)}$$

Ans- b)



ABCD is the plane wavefront - divided into small concentric circles called as zone.

• Area of first zone is first half period zone.

• Area between first and second zone is second half period zone and so on.

• The path difference between each zone is $\lambda/2$, so it is called half period zone.



In the right angle triangle, OM_1P ,
 $M_1P^2 = OM_1^2 + OP^2$

$$\left(\frac{b+\lambda}{2}\right)^2 = OM_1^2 + b^2$$

$$b^2 + \frac{\lambda^2}{4} + b\lambda = OM_1^2 + b^2$$

$$OM_1^2 = \cancel{b^2} - \cancel{b^2} + \frac{\lambda^2}{4} + b\lambda$$

Ignoring $\lambda^2/4$ as it is small -

$$\underline{OM_1 = \sqrt{b\lambda}}$$

In Δ^u , OM_2P

$$M_2P^2 = OM_2^2 + OP^2$$

$$(b+\lambda)^2 = OM_2^2 + b^2$$

$$b^2 + \lambda^2 + 2\lambda b = OM_2^2 + b^2$$

$$OM_2^2 = 2\lambda b$$

$$\underline{OM_2 = \sqrt{2b\lambda}}$$

$$\dots \text{Ify } \underline{OM_n = \sqrt{n b \lambda}}$$

The radius ratio: $OM_1 : OM_2 : OM_3 : \dots : OM_n$
 $\sqrt{1} : \sqrt{2} : \sqrt{3} : \dots : \sqrt{n}$

$$\begin{aligned} \text{Area of } OM_1 \text{ circle} &= \pi r^2 \Rightarrow \pi (OM_1)^2 \\ &\Rightarrow \pi (\sqrt{b\lambda})^2 \\ &\Rightarrow \pi b\lambda \end{aligned}$$

$$\begin{aligned} \text{Area of } OM_2 \text{ circle} &= \pi (OM_2)^2 - \pi (OM_1)^2 \\ &= \pi (\sqrt{2b\lambda})^2 - \pi (\sqrt{b\lambda})^2 \\ &= 2\pi b\lambda - \pi b\lambda \\ &\Rightarrow \pi b\lambda \end{aligned}$$

$$\therefore \text{Area of all zones} = \underline{\pi b\lambda} \quad (\text{each zone}) //$$



B. L. D. E. Association's

S. B. ARTS & K. C. P. SCIENCE COLLEGE, VIJAYAPUR

INTERNAL TEST 20 -20

Name / ಹೆಸರು: Sakshi. S. Ejur Roll No./ಸ್ಥಳಾಂಕ: 166 Date / ದಿನಾಂಕ: 11-2-2024

Subject/ವಿಷಯ: Physics (O.E.C) Semester/ಸೆಮಿಸ್ಟರ್: III Exam Seat No / ಪರೀಕ್ಷಾಸ್ಥಳಾಂಕ: U156P19250005

Invigilator's Signature / ಕೊಠಡಿ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ Signature of Evaluator / ಪರೀಕ್ಷಕರ ಸಹಿ Marks obtained / ಪಡೆದ ಅಂಕಗಳು

30/20

10/10

Q. No 1
(a) Climate is defined as the change in our lon. the atmosphere over a long period of time in specific area is called climate

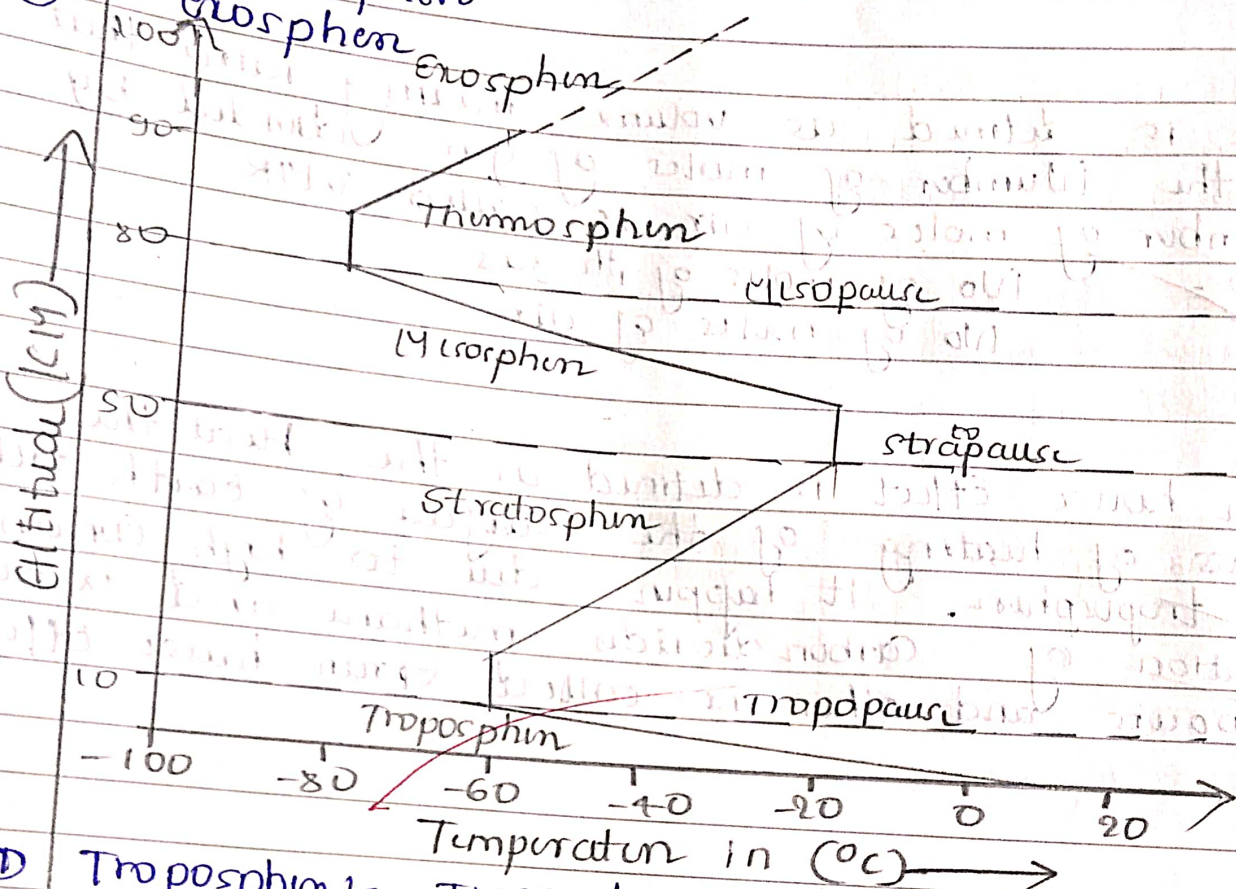
(b) VMR is defined as volume mixing ratio that is the Number of moles of gas divided by Number of moles of air is called VMR
$$VMR = \frac{\text{No of moles of } i\text{th gas}}{\text{No of moles of air}}$$

(c) Green house Effect is defined as the Heat the process of heating of the surface of Earth till the troposphere. it happen due to high Concentration of carbon dioxide, methane and water vapours and other is called Green house Effect

Q. 12/011
 (a)

atmosphere:- atmosphere is defined as the air surrounded by the Earth and mixture of different layers is called atmosphere.
 There are 5 types of atmosphere.

- ① Troposphere
- ② Stratosphere
- ③ Mesosphere
- ④ Thermosphere
- ⑤ Exosphere



① Troposphere:- Troposphere is the first layer of Earth's surface. It is about 20 km above the Earth's surface. It is in the polar region where man and other living organisms can live. This region is characterised by the weather change and steady decrease in temperature. Decreasing temp with increasing height. It decreases about -60°C in the upper layer.

② Stratosphere:- it is the second layer of air mass extending about 30 km above the Troposphere. The upper layer of the stratosphere is called as stratopause. In this region the temperature increases from -60°C to maximum 5°C . The good ozone is present in the stratosphere.

③ Mesosphere:- it is the third layer of the atmosphere. It is next to the stratosphere. The upper layer of the Mesosphere is called Mesopause. This region is characterised by the low atmospheric pressure and low temperature. It is next to the Stratosphere.

④ Thermosphere:- it is the fourth layer of the atmosphere and it is next to the Mesosphere. It extends about 500 km above the Earth's surface. This region is characterised by the steady temperature increase and the temperature drops to begin to drop from the stratosphere. Thermosphere includes the region including ultraviolet rays and cosmic rays. These cause ionisation like oxygen and Nitric oxide. This is called ionosphere.

⑤ Exosphere:- It is the last layer of the atmosphere and next to the Thermosphere is called Exosphere.

or outersphere at which there are atoms except Hydrogen and Helium. It is about 39190 km above the Earth's surface. Exosphere in this region has very high temperature due to solar radiation.

(b)

Weather

It is the atmospheric condition at specific area in given point in time. Thus the condition of atmosphere take place day by day and minute by minute.

Weather is defined as the short term change in the atmosphere.

It has only one condition.

It occurs in short period of time.

It is frequently changed.

Weather what we get on the daily basis.

It is formed as particular area.

It takes short period of time.

Study of weather is called Meteorology.

Climate

While the climate is the average weather condition over a place & take place after 30 years of the time.

Climate is defined as change in atmosphere over long period of time.

It involves all the conditions like temperature, pressure, humidity etc.

It occurs in long period of time.

It does not change frequently.

Climate what we expect over long time.

It is formed as the large area.

It takes decades or centuries.

Study of climate is called Climatology.

fw - moisture wind

fw - rain, temperature

Q. No

III

① global warming :- global warming is defined as the gradually increasing the average temperature of Earth atmosphere is called global warming.

Cause of global warming -

① Burning of fossil fuels - fossil fuels are the most important to our lives. fossil fuels are used in transportation and production of electricity. Burning fossil fuels will cause the green house effect that leads to global warming. burning of fossil fuels it release a harmful gas like Carbon dioxide this gas leads to the global increase in the temperature.

② Deforestation :- all the plants and animals are breathing and inhaling oxygen. organism inhaling oxygen and plants inhaling Carbon dioxide. due to the cutting of trees. Carbon dioxide is abundant in nature. this harmful gas leads to rise in temperature of the atmosphere this leads to global warming.

③ Industrial waste! — Industries and factories release harmful chemical gases. In the form of waste from the factories, these gases mix in the atmosphere and the atmosphere is polluted. This leads to an increase in temperature. Its effect on the greenhouse effect and greenhouse effect leads to global warming.

④ Volcanos! — Volcanos are the most significant natural causes of global warming when the volcanic eruption is occurred that ash and smoke are mixing in the atmosphere and temperature of atmosphere is gradually increasing. The phenomenon of gradually increasing leads to global warming.

⑤ Smoke and air pollution! — Smoke and air pollution are the most dangerous impact on the global warming. The smoke and fog are combined to form the smog. This smog is mixed with gases in the atmosphere and causes air pollution.

⑥ Air population! — If the population is increased then the carbon dioxide is released in more amount in the nature. Every individual is breathing and every individual inhaling oxygen and exhaling carbon dioxide. If the population increases then the carbon dioxide is increasing. Carbon dioxide causes the rising the temperature in the atmosphere. This leads to the global warming.

⑧ prevention for the Green house Effect
Increase in the atmosphere and destruction is decreased

* Conventional Energy is the method to reduce the Green house Effect

* Instead of Burning Fossil fuels we use alternative sources like wind Energy, Solar Energy, tidal Energy.

* restriction for the releasing of harmful gases from the industries and factories

* planting more number of trees.

* stop using organic fertilizers like nitrous oxide this leads to the green house Effect

* use CNG gases instead of using and Burning of fossil fuels.

* Don't use fossil fuels like petrol, diesel. Use instead of CNG gases

* Controlling the over population

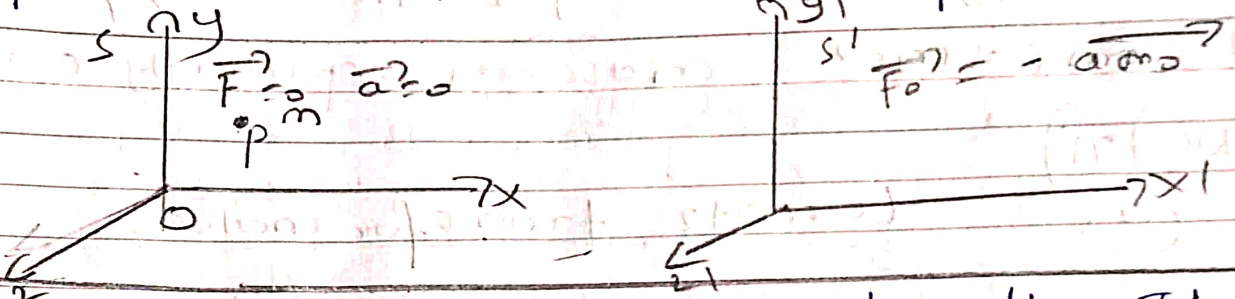
* do not use vehicles for short distance. go for walking for short distance



Name / ಹೆಸರು: Pooja M. Bagali 2nd INTERNAL TEST 2023-2024 Date / ದಿನಾಂಕ: 9/02/24
 Subject / ವಿಷಯ: physics Roll No. / ಸ್ಥಾನಿಕೆ: 196 4th Sem Exam Seat No. / ಪರೀಕ್ಷಾ ಸ್ಥಾನಿಕೆ: 01SKR721K0346
 Semester / ಸಮಸ್ಯೆ: 4th Sem Paper - (A)
 Invigilator's Signature / ಕೋಶದ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ: _____ Signature of Evaluator / ಪರೀಕ್ಷಕರ ಸಹಿ: _____ Marks obtained / ಪಡೆದ ಅಂಕಗಳು: 30/30
 g. No. 1) 15/15

a) These force are not really act on particle but appears due to acceleration of the frame is called fictitious force.

Suppose that S is Inertial frame and another one is S' and moving acceleration $\vec{a}_0$ relative to S . No external force is zero in the S & S' frame.



c) wave function is defined as the It is the variable quantity It can be characterized by the de-broglie wave is called wave function. It is denoted in $\psi(\psi)$

d) * Normalization condition:-

$p(x)$ is probability of function

$p(x) dx =$ probability of finding particle in a small volume

$dx = dx dy dz$

Integral form

$$\int p(x) dx = 1$$

wave function The integration is taken from whole space

$$\therefore p(x) dx = 1$$

and t & t' are the time taken measured in the frame and origin O

now the source of light is situated in the origin O and the wave front of light is emitted at $t=0$ if the it reaches to the 'p' point and time and position is measured by the observer of O

Time measured by the light signal transverse distance of Op in the S frame is given by

$$t = \frac{Op}{c} \quad (x^2 + y^2 + z^2)^{1/2} \quad \text{--- (1)}$$

Time reached by the light signal transverse distance of Op in S' frame is given by

$$t' = \frac{O'p}{c} \quad (x'^2 + y'^2 + z'^2)^{1/2} \quad \text{--- (2)}$$

Subtracting Eqn (2) from (1)

$$x^2 + y^2 + z^2 - x'^2 - y'^2 - z'^2 = c^2 t^2 - c^2 t'^2 \quad \text{--- (3)}$$

Eqn (3) becomes

$$x^2 - x'^2 = c^2 t^2 - c^2 t'^2 \quad \text{--- (4)}$$

Transformation of x & x' can be written as

$$x' = k(x - vt) \quad \text{--- (5)}$$

and t & t' can be written as

$$t' = a(t - bx) \quad \text{--- (6)}$$

a & b are the constants subtracting x' & t' in Eqn (7)

$$x^2 - c^2 t^2 = x'^2 - c'^2 t'^2$$

$$x^2 - c^2 t^2 = k^2 (x - vt)^2 - c^2 a^2 (t - bx)^2$$

$$x^2 - c^2 t^2 = k^2 (x^2 + vt^2 - 2xvt) - c^2 a^2 (t^2 + b^2 x^2 - 2abxt)$$

$$x^2 - c^2 t^2 = k^2 x^2 + k^2 vt^2 - k^2 2xvt - c^2 a^4 t^2 - c^2 a^2 b^2 x^2 + c^2 a^2 2abxt$$

$$x^2 - c^2 t^2 = (k^2 - c^2 a^2 b^2) x^2 - (k^2 vt - c^2 a^2 b) xt + (-c^2 a^4 t^2 + \frac{k^2 v^2}{c^2} x^2 t^2) \quad (4)$$

Equating the coefficient of corresponding terms

$$k^2 - c^2 a^2 b^2 = 1 \quad (8)$$

$$k^2 v - c^2 a^2 b = 0 \quad (9)$$

$$a^2 - \frac{k^2 v^2}{c^2} = 1 \quad (10)$$

Solving the two equations and find the a & b values

$$k = a = \frac{1}{\sqrt{1 - v^2/c^2}} \quad (11)$$

$$b = \frac{v}{c^2} \quad (12)$$

Put the a & b values in eq (9) & (6)

$$x' = k(x - vt) = \frac{1}{\sqrt{1 - v^2/c^2}} (x - vt)$$

$$x' = \frac{x - vt}{\sqrt{1 - v^2/c^2}}$$

$$t' = a(t - bx) = \frac{1}{\sqrt{1 - v^2/c^2}} (t - \frac{v}{c^2} x)$$

$$= \frac{t - vx}{c^2}$$

$$\boxed{x' = \frac{x - vt}{\sqrt{1 - v^2/c^2}} \quad y' = y \quad z' = z \quad t' = \frac{t - vx}{c^2}}$$

It is the Equation of Lorentz transformation in the inverse transformation interchanging the co-ordinates

$$\boxed{x' = \frac{x + vt'}{\sqrt{1 - v^2/c^2}} \quad y' = y \quad z' = z \quad t' = \frac{t' + vx}{\sqrt{1 - v^2/c^2}}}$$

It is Lorentz transformation //

rest

mass of the particle $m = gm_0$
velocity of particle $= V = ?$

we know that

$$m = \frac{m_0}{\sqrt{1 - v^2/c^2}}$$

$$gm_0 = \frac{m_0}{\sqrt{1 - v^2/c^2}}$$

$$\sqrt{\frac{1 - v^2}{c^2}} = \frac{m_0}{gm_0} = \frac{1}{g}$$

$$= \sqrt{\frac{1 - v^2}{c^2}} = \frac{1}{81}$$

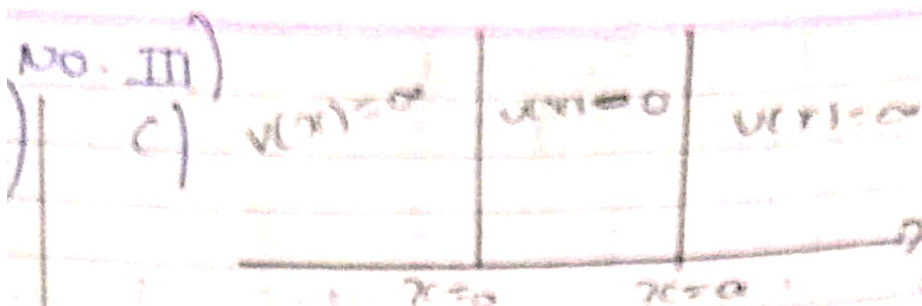
$$\frac{v^2}{c^2} = 1 - \frac{1}{81} \in$$

$$v^2 = \frac{80}{81}$$

$$V = \sqrt{\frac{80}{81}} c$$

$$V = \sqrt{\frac{80}{81}} c$$

$$\left\{ \begin{array}{l} V = 0.994 c \\ V = 0.994 c \end{array} \right\}$$



Consider a In quantum mechanics:
 - the box means rigid free space of particle experiences no force of potential energy of the particle is zero and in the region of outside interval infinite region.

For 1D of the box means a particle is allowed and moving in a straight line along x-axis.

A wall of box means is rigid & perfectly elastic. A particle is rebounded by the kinetic energy and total energy of the E can be remains constant.

A wall of box is a non-penetrable and there no probability of finding particle in outside of the box.

Potential energy function of 1D $V(x)$ is given by

$$V(x) = \begin{cases} 0 & 0 < x < a \\ \infty & x < 0 \text{ or } x > a \end{cases}$$

For 1D of Schrodinger time independent wave function is given by

$$\frac{d^2\psi}{dx^2} + \frac{2m}{\hbar^2} (E - V) \psi = 0 \quad (2)$$

for $0 < x < a$, $V=0$
eqn (2) becomes

$$\frac{d^2\psi}{dx^2} + \frac{2m}{\hbar^2} (E - V) \psi = 0$$

$$\frac{d^2\psi}{dx^2} + k^2 \psi = 0 \quad (3)$$

$$k^2 = \frac{2mE}{\hbar^2} \quad k = \sqrt{\frac{2mE}{\hbar^2}}$$

$$k = \sqrt{\frac{2mE}{\hbar^2}} \rightarrow (4)$$

In general equation (3) becomes
 $\psi(x) = A \sin kx + B \cos kx \rightarrow (5)$

$$\psi(x) = 0 \quad x=0$$

$$0 = 0 + \cos(B)$$

$$0 = 0 + B \rightarrow (6)$$

Substituting eqn (6) in eqn (5)

$$\psi(x) = A \sin kx \rightarrow (7)$$

$$\psi(x) = 0 \quad x=a$$

$$0 = A \sin ka \quad A \neq 0, 0, \pm 1, n, \pm 2n$$

In general

$$ka = n\pi$$

$$k = \frac{n\pi}{a} \rightarrow (8)$$

Comparing eq (4) & (8)

$$\frac{n^2 \pi^2}{a^2} = \sqrt{\frac{2mE}{\hbar^2}}$$

$$E = \frac{n^2 \pi^2 \hbar^2}{2ma^2}$$

$$E = \frac{n^2 \pi^2 \hbar^2}{2ma^2}$$

$$E = \frac{n^2 \pi^2 \hbar^2}{2ma^2} \rightarrow (9)$$

$$E_n = \frac{n^2 \pi^2 \hbar^2}{2ma^2} \rightarrow (9)$$

Eigen value of zero point energy

$$E_1 = \frac{1^2 \pi^2 \hbar^2}{2ma^2} \rightarrow \text{zero point energy}$$

$$E_2 = \frac{4 \pi^2 \hbar^2}{2ma^2}$$

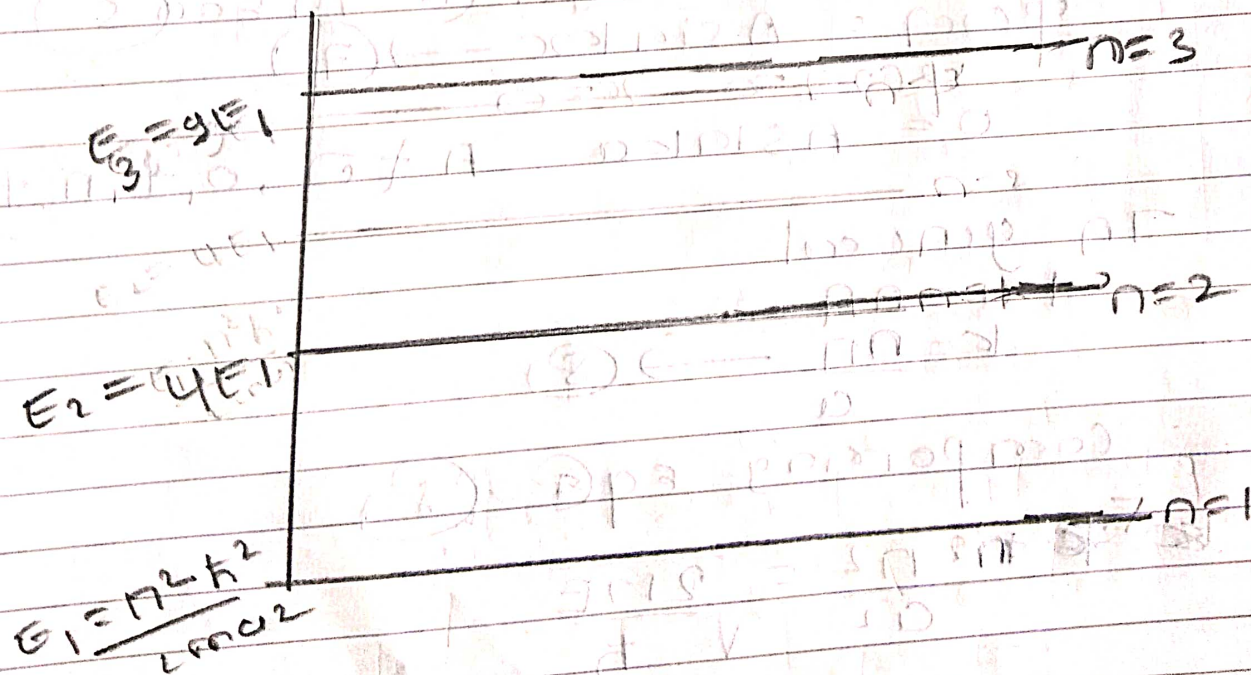
put $n=2$

$$E_2 = \frac{2^2 \pi^2 \hbar^2}{2ma^2} = 4E_1$$

$$E_2 = 4 \frac{\pi^2 \hbar^2}{2ma^2} = 4E_1$$

put $n=3$

$$E_3 = \frac{9 \pi^2 \hbar^2}{2ma^2} = 9E_1$$



Name / ಹೆಸರು : _____

Subject/ವಿಷಯ : _____

Roll No./ಸ್ಥಳಾಂಕ : _____

Date/ದಿನಾಂಕ : _____ -20

Invigilator's Signature / ಕೊಠಡಿ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ _____

Semester/ಸೆಮಿಸ್ಟರ್ : _____

Exam Seat No./ಪರೀಕ್ಷೆ ಸ್ಥಳಾಂಕ : _____

Signature of Evaluator / ಪರೀಕ್ಷಕರ ಸಹಿ _____

Marks obtained/ ಪಡೆದ ಅಂಕಗಳು _____

--	--

Q. No.

III)

d)

d)

Postulates of quantum mechanics

* All the state of system and n degree of freedom is described by the wave function $\psi(x,t)$

* Every physical observable is associated with linear hermitian operator. measurable quantity can be represented by the mathematical operator.

* Only one possible of value is measurable of observable is given by

$$\hat{A} \psi = A \psi$$

$A \rightarrow$ Eigen value

$\hat{A} \rightarrow$ Eigen function

* The development of time is measurable by the system is given by wave function.

$$\hat{H} \psi = E \psi$$

$E \rightarrow$ Eigen value

$\hat{H} \rightarrow$ Hermitian function

* The average value of 'a' is corresponding to the operator 'A' if then the system of wave function is given by

$$\langle a \rangle = \frac{\int \psi^* A \psi d\tau}{\int \psi^* \psi d\tau}$$

τ - constant
 $a \rightarrow$ average value



B. L. D. E. Association's

S. B. ARTS & K. C. P. SCIENCE COLLEGE, VIJAYAPUR

II

INTERNAL TEST 20 -20

U15KMA150014

Name / ಹೆಸರು: Laxmi Rajput Roll No./ಸ್ಥಳಾಂಕ: 314 Date / ದಿನಾಂಕ: 13-2-2024Subject/ವಿಷಯ: Physics Paper II Semester/ಸೆಮಿಸ್ಟರ್: V Exam Seat No / ಪರೀಕ್ಷೆ ಸ್ಥಳಾಂಕ: _____

Invigilator's Signature / ಕೂರಡಿ ಮೇಲ್ವಿಚಾರಕರ ಸಹಿ Signature of Evaluator / ಪರೀಕ್ಷಕರ ಸಹಿ Marks obtained / ಪಡೆದ ಅಂಕಗಳು

Q1

- Q1
- (a) Pauli's Exclusion principle - It states that a single atom, no two electron will have same set of quantum number (n, l, s, m_s or m_l)
- It is depend on the following as
- two electron have the same orbital
 - two electron have the same orbital but opposite or anti parallel

- (c) Relation between einstein A & B coefficient
- $$\frac{B_{12}}{B_{21}} = 1 \quad \frac{A_{21}}{B_{21}} = \frac{8\pi h \nu^3}{c^2}$$

- (d) phase space - It define ^{the combination} has a position & momentum of particle
- It has 6 orientation there 3 are in position phase space & 3 are in momentum phase space x, y, z, P_x, P_y, P_z

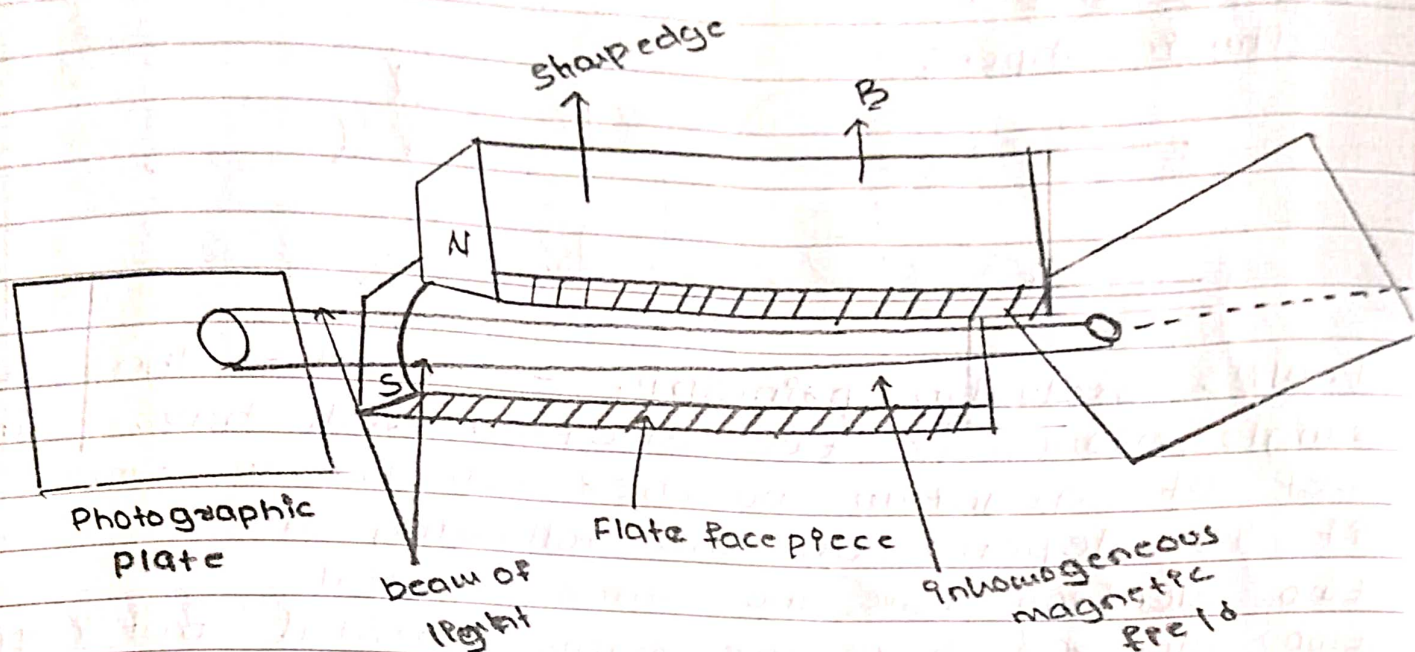
- (e) (selection x)

Q2

- (a) Stern Gerlach experiment

In this experiment the electron spin hypothesis & Spatial quantization of the quantum

In Stern Gerlach mean it is a device which calculate the single silver atom



A well define the Stern Gerlach experiment tell that the silver evaporation the atom & letting the atom through a hole in a silver plate is shown in fig

It has a silver plate atom at inhomogeneous magnetic field & it has two piece one is sharp edge & other one is flat face piece when the letting of atom shown in photographic plate

In the angular momentum μ of the magnetic field B in the figure

In the experimental set the angular momentum μ of the magnetic field B in z -direction & beam enter along with x -axis

The angular momentum μ in magnetic field B in z -direction the force act on z -direction so F_z in z -direction

$$F_z = \mu \frac{\partial B}{\partial z}$$

$$= \mu \cos \theta \frac{\partial B}{\partial z}$$

In θ is the angle of orbital quantum number. Since the magnetic field are also applied in it.

In $\cos \theta = +ve$ it pulled upward & $\cos \theta = -ve$ it pulled downward.

The angular momentum & the magnetic field is no force applied in it hence it will go straight.

The angular momentum is applied parallel to the magnetic field B it suffer the maximum upward & the angular momentum is applied to the antiparallel to the magnetic field B it suffer the maximum downward.

When spreading of the beam will split into two distinct line.

Steen Gerlach it is a device with which calculate the individual silver atom.

b) Difference between Normal & Anomalous zeeman effect

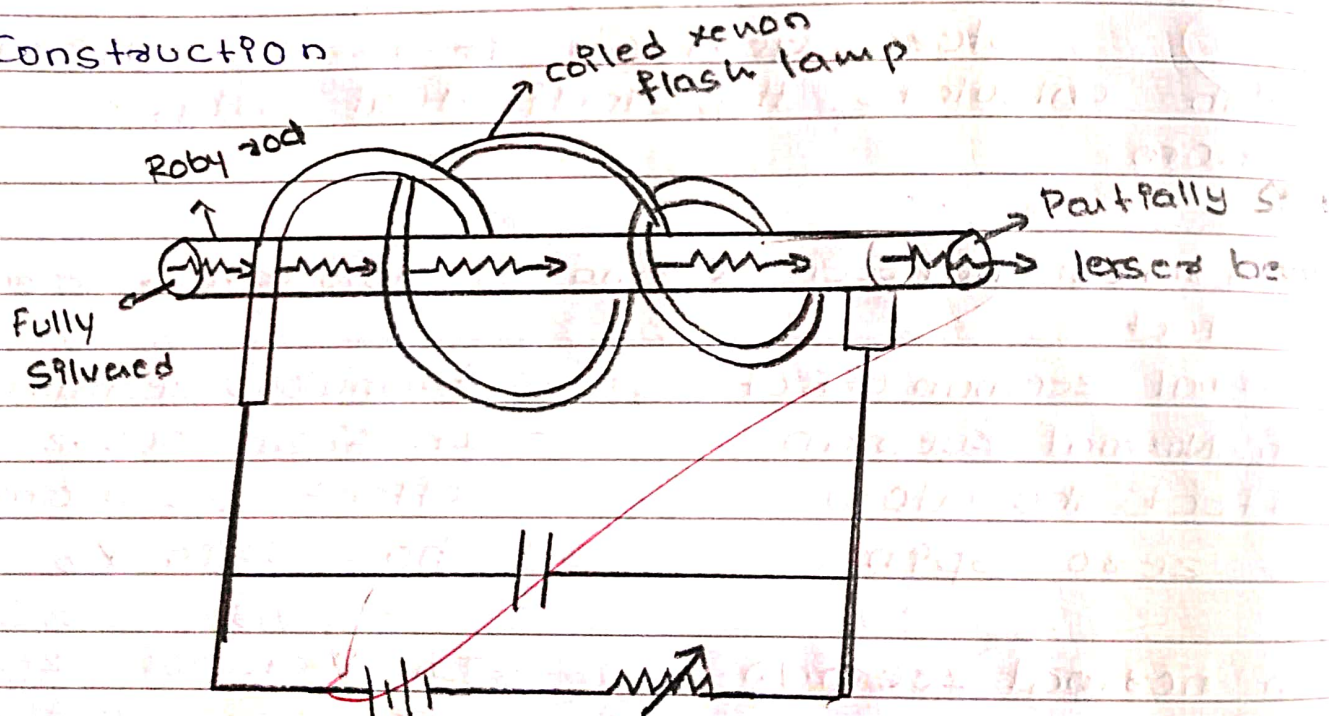
	Normal zeeman effect	Anomalous zeeman effect
-	In Normal zeeman effect the atom is zero spin	- In Anomalous zeeman effect the atom has spin $\frac{1}{2}$
-	In normal zeeman effect when we applied the weak magnetic field it transmitted only three	- In Anomalous zeeman effect when we applied weak magnetic field it transmitted two only

Normal zeeman effect	Anomalous zeeman effect
- It observe the transmission only three	- It observe the transmission more than three
- It observed have a two valence electron on even number of valence electron	- It observed have a single valence electron or odd number of valence electron
ex - Calcium	ex - Sodium

Q3

(a) Ruby Laser

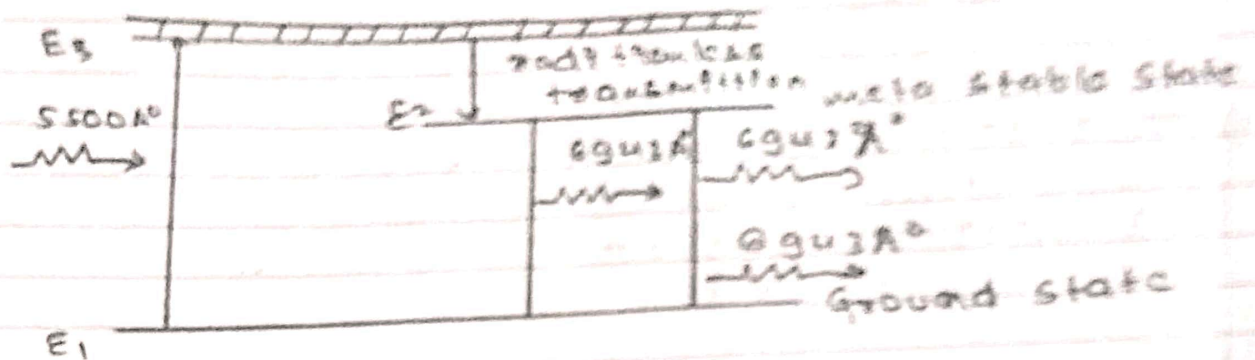
Construction



In ruby laser there are the ruby rod. It is solid state, it consists of pink cylindrical rod, it has fully silvered & partially silvered & two ends use the ruby rod.

The Coiled xenon flash lamp connected to the capacitor of discharge the thousand joule of energy in few milliseconds

Working



The ruby rod have the aluminium oxide doped with 0.05% of Chromium oxide & mixed with each other the Al^{3+} is replaced with the Cr^{+++} ion.

Normally when Cr^{+++} ion are in ground state the flash lamp are observed to ground state that ion come to excited state: E_3

In transmission one of the pumping transmission the excited ion are give up & part to the crystal plate to the collision

the corresponding transmission 2 is transmission

the transmission E_2 is more large life time & the number of ion increase & the number of ion decrease go to ground state

the transmission is the population inversion establish meta stable state E_2 & ground state E_1 of meta stable state to ground state in ruby rod parallel & crystal to the rod, the beam of light fall E_1 goes E_3

(b) Components of Laser

- (a) energy source
- (b) Active medium
- (c) laser cavity

(a) energy source - It energy source is supply ^{energy} to the active medium it has the lower energy state to higher energy state it has different pumping method are optical, electrical & chemical pumping method

(b) Active medium - when light source is amplified is known as Active medium the energy increase with the complete life time

Laser cavity - In laser cavity there are two mirrors m_1 & m_2 m_1 is the fully reflected mirror & m_2 is the partially reflected mirror laser cavity is coming out from the partially reflected mirror