2023

माध्यमिक शिक्षा मण्डल, मध्यप्रदेश, भोपाल

32 पृष्ठ

परीक्षार्थी द्वारा भरा जावे ↓

परीक्षा का विषय	विषय कोड	परीक्षा का माध्यम
Physics	210	English

स्टीकर तीर के निशान ↓ से मिलाकर लगायें

परीक्षार्थी द्वारा भरा जावे →

परीक्षार्थी का रोल नम्बर

2	3	6	7	2	5	2	4	2	☒

शब्दों में

दो	तीन	छः	सात	दो	पाँच	दो	चार	दो	☒

प्रश्न पत्र का सेट C

केन्द्राध्यक्ष / सहायक केन्द्राध्यक्ष एवं पर्यवेक्षक द्वारा भरा जावे →

क :– परीक्षार्थी का कक्ष क्रमांक 06

ख :– परीक्षा का दिनांक 06 / 03 / 2023

परीक्षा का नाम एवं परीक्षा केन्द्र क्रमांक की मुद्रा

H.S.S.

केन्द्र क्र. 671001

पर्यवेक्षक का नाम एवं हस्ताक्षर	केन्द्राध्यक्ष / सहायक केन्द्राध्यक्ष के हस्ताक्षर
06/03/23	Shrivastava

परीक्षक एवं उपमुख्य परीक्षक द्वारा भरा जावे ↓

परीक्षक एवं उपमुख्य परीक्षक द्वारा भरा जावे →

प्रमाणित किया जाता है कि होलो क्राफ्ट स्टीकर क्षतिग्रस्त नहीं पाया गया तथा अन्दर के पृष्ठों के अनुरूप मुख्य पृष्ठ पर अंकों की प्रविष्टी एवं अकों का योग सही है।

निर्धारित मुद्रा : नाम, पदनाम, मोबाईल नम्बर, परीक्षक क्रमांक एवं पदांकित संस्था के नाम की मुद्रा लगाएं।

उप मुख्य परीक्षक के हस्ताक्षर एवं निर्धारित मुद्रा	परीक्षक के हस्ताक्षर एवं निर्धारित मुद्रा
A.N. PANDEY V.N.-741351 G.J.E.H.S.S.Mandla	Yogesh Chourasiya V.N.-741282 G.H.S.S.No.-2 Mandla

केवल परीक्षक द्वारा भरा जावे

प्रश्न क्रमांक के सम्मुख प्राप्तांकों की प्रविष्टी करें।

प्रश्न क्रमांक	पृष्ठ क्रमांक	प्राप्तांक (अंकों में)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
2		
2		
2		
2		
2		
2		
2		

प्राप्तांक शब्दों में ... कुल प्राप्तांक अंकों में ...

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Correct the options :-

Answers

(a) (ii) Mumbai
(b) (iii) 0.72 eV
(c) (i) Junction diode.
(d) (i) less than
(e) (ii) 1.67×10^{-27} kg
(f) (iii) Ampere / metre^2
(g) (iii) $\frac{\Lambda}{2}$.

Question no → (2)

Fill in the blanks

Answers :-

(i) Zero
(ii) ~~(i) Remain Same (constant)~~
(b) (ii) Gamma rays
(iii) Megahertz
(or), 10^{14} Hertz.
(iv) decreased.
(v) Vector
(vi) Sensitivity
(vii) Zero.

True or False :-
Answers

(i) True
(ii) True
(iii) False
(iv) False
(v) True
(vi) False
(vii) False

Question no. → (4)

One word Answer

(i) → Bending of light through the edges of slit is called diffraction.
(ii) → Diopter (D)
(iii) → From South pole to North pole.
(iv) → A high resistance wire is connected in series with the coil of galvanometer.
(v) → Drift velocity decreases.
(vi) → $E = \frac{1}{2}mv^2_{(max.)} = h(\nu - \nu_0)$
(vii) → Minimum frequency exist with

which the electrons get emitted out of the metal surface is called threshold frequency.

Question no. → (5)

Biot Savart law :- Biot Savart deduce an expression for the intensity of magnetic and current carrying conductor I.

Let XY be a conductor with current I carrying in it has small element dl i.e, current element and a point P is taken at distance r from the current element where the intensity of magnetic field dB is found. The Intensity of magnetic field is dB given by :-

(i) directly proportional to the current.

$$dB \propto I \quad - (1)$$

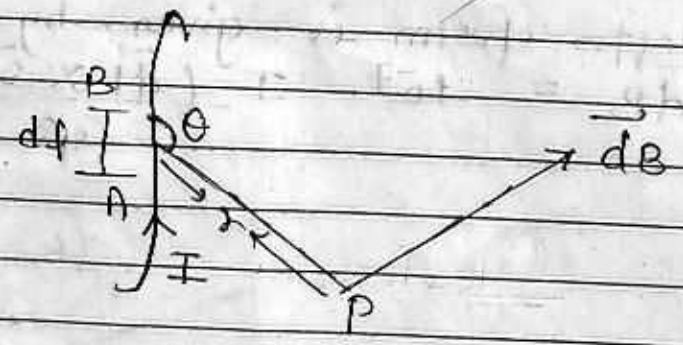
(ii) dB to the $\sin\theta$ where θ is angle b/w the small element and observation point.

$$dB \propto \sin\theta \quad - (2)$$

(iii) dB is directly proportional to current element

$$dB \propto dl \quad - (3)$$

(iv) $$dB \propto \frac{1}{r^2} \quad - (4)$$



$$dB \propto \frac{Idl\sin\theta}{r^2}$$

$$dB = k\frac{Idl\sin\theta}{r^2}$$

$$k = \frac{\mu_0}{4\pi}$$

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

$$dB = 10^{-7}\frac{Idl\sin\theta}{r^2} \text{ Tesla}$$

In vector form :-

$$dB = 10^{-7}\frac{Idl\sin\theta}{r^2}\hat{r}$$

$$\hat{r} = \frac{\vec{r}}{|\vec{r}|}$$

$$\vec{dB} = 10^{-7}\frac{I(\vec{dl}\times\vec{r})}{r^3} \text{ Tesla}$$

or,

$$\vec{dB} = -10^{-7}\frac{I(\vec{r}\times\vec{dl})}{r^3} \text{ Tesla}$$

Thus, the biot savart in expression

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of vector form is given by :-

$$dB = 10^{-7} \frac{I(\vec{dl} \times \vec{r})}{r^3} \text{ Tesla.}$$

Question no. → (6)

Power of bulb = P = 200 watt

V = 220 V

Resistance of bulb = R = ?

We know that :

$$P = \frac{V^2}{R}$$

$$R = \frac{V^2}{P}$$

$$R = \frac{(220)^2}{200} = \frac{220 \times 220}{200}$$

$$R = 22 \times 11$$

$$R = 242 \text{ ohm}$$

(Alternate) or,

$$P = \frac{V^2}{R}$$

$$200 = \frac{220 \times 220}{R}$$

$$200 = \frac{48400}{R}$$

$$200R = 48400$$

$$R = \frac{242 - 48400}{200}$$

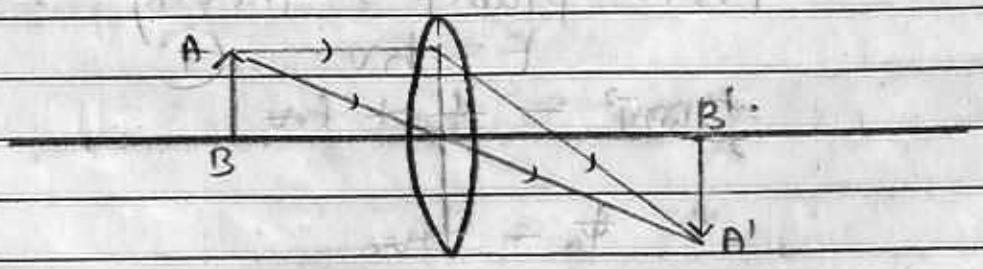
$$R = 242 \Omega$$

Thus, the resistance of the bulb is

242 ohm. (i.e, $R = 242\ \Omega$)

Question no. → (7)

Conjugate foci :- The conjugate foci is defined as the point on the principal axis at which the image is formed when an object is placed near the lens. In the principal axis, when an object is placed at a point at some distance from the optical center of lens then after refraction an image is formed at the principal axis on another point. This point on the principal axis is called conjugate foci. The image formed is always real. So that only convex lens has conjugate foci because convex lens can formed real image.



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Question no. → (8)

Photoelectric effect :- When Ultra Violet radiation of suitable frequency become to fall on the photo sensitive substance then the electrons get emitted out fuet the metal surface. This is called photoelectric emission. The ~~the~~ electrons ejected out are called photoelectrons.

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Einstein photoelectric equation :- On the basis of planck constant einstein gave the law. He stated that the photon's energy is distributed in two part :-

(i) Some energy is used by electron to come out the metal surface

(ii) Some energy is used to give velocity to the electron.

From planck's theory :-

$E = h\nu$ - (1)

~~$\frac{1}{2}mv^2 = \phi_0 + h\nu$~~

~~$\phi_0 = h\nu_0$~~

~~$\frac{1}{2}mv^2 = h\nu_0 + h\nu$~~

$$\phi_0 = \frac{1}{2}mv^2 + h\nu \quad \text{— (1)}$$

For work function :-

$$\phi_0 = h\nu_0$$

(1) :- $h\nu_0 = \frac{1}{2}mv^2 + h\nu$

$$\frac{1}{2}mv^2(\text{maxi}) = h\nu - h\nu_0$$

$$\frac{1}{2}mv^2(\text{maxi}) = h(\nu - \nu_0)$$

Question no. → (9)

Two postulates of Bohr's model are as follows :-

i) Electron are moving in any orbit instead of they are revolving in some specific orbit which are known as non-radiating orbit or stationary orbit. These orbit does not radiate energy.

ii) Electrons revolve only in those orbit in which its angular momentum is an integer multiple of $\frac{h}{2\pi}$, where h is the plancks constant.

$h = 6.67 \times 10^{-34}$ J/s.

The angular momentum of mass m

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and velocity v is given by :-

$$P_\theta = mvr = \frac{nh}{2\pi}$$

$n = 1, 2, 3$

n is called principle quantum number. It is called Bohr's Quantum theory.

Question no. → (10)

Isotopes :- The number of different elements of atom in which number of proton is same but the number of neutron is different from each other these are called Isotopes.

For example :- Hydrogen atom has three isotopes.

(i) ${}_1^1H$ ${}_1^2H$

(ii) ${}_1^3H$

(iii)

The two isotopes of hydrogen atom are :-

(i) Deutrium → ${}_1^2H$

(ii) Tritium → ${}_1^3H$

Question no. → (11)

Fundamental Charge :- Fundamental Charge is defined as the number of electrons flowing in the entire range of conductor. The amount of coulomb charge present in any conductor by which it show electrical current is known as fundamental charge.

The value of fundamental charge is

$$e = 1.6 \times 10^{-19} \text{ coulomb.}$$

The Charge on one electron of the conductor is given by e, and it is also known as electronic charge.

$$e = \pm 1.6 \times 10^{-19} \text{ Coulomb.}$$

Charge on proton $= +1.6 \times 10^{-19}$ Coulomb

Charge on electron $= -1.6 \times 10^{-19}$ Coulomb

From Quantization of charge :-

$$Q = \pm ne$$

Question no. → (12) (OR)

Ohm's law :- In the physical condition of conductor (i.e, temperature, mechanical Strain etc) remain unchanged then the current flowing in the conductor

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is directly proportional to the potential difference applied across the end of conductor. If V be the potential difference and I be the current then :-

$$V \propto I$$

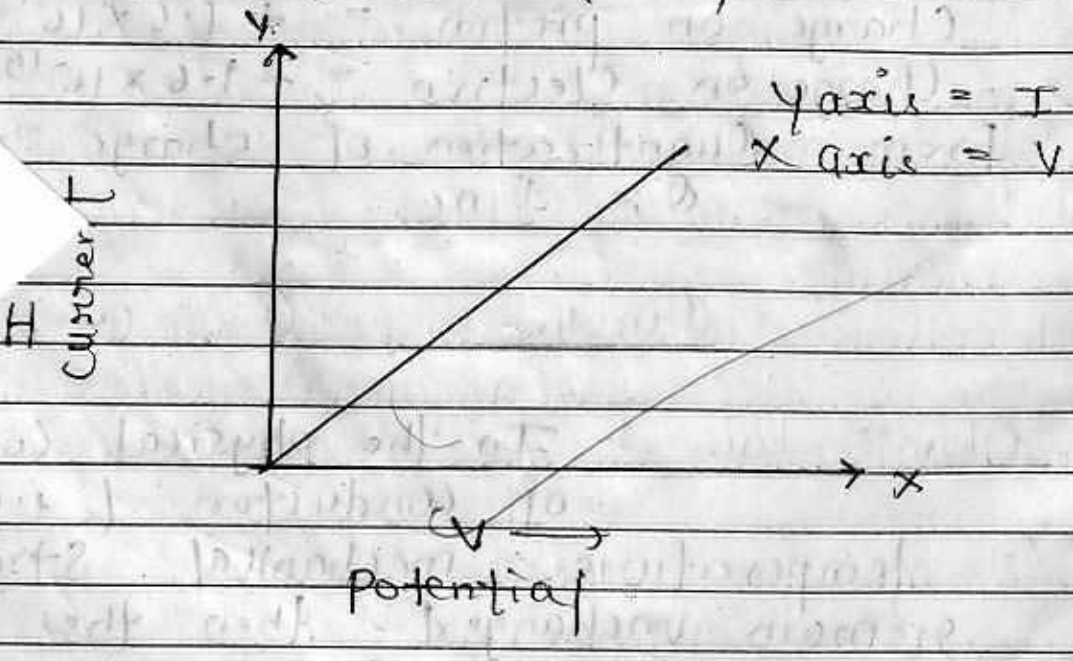
$$V = IR$$

$$R = \frac{V}{I}$$

Resistance = $\frac{\text{Potential difference}}{\text{Current}}$

B
S
E

Graph :- When we plot the graph between the voltage V and current I then the straight line is obtained.



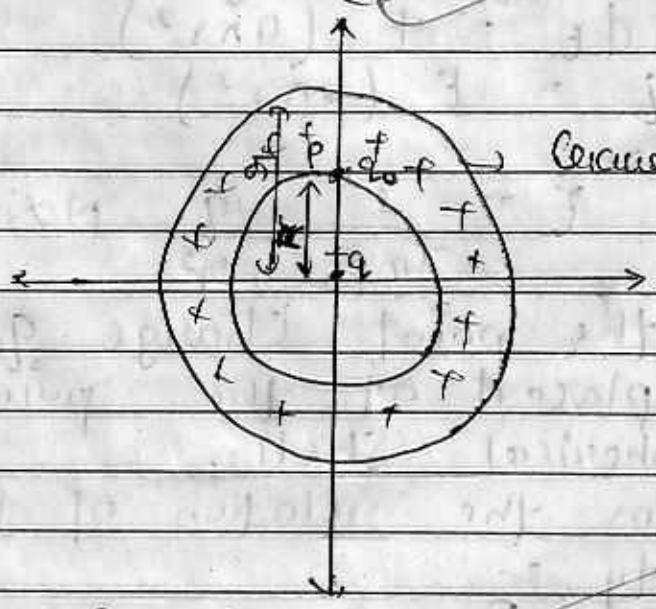
~~Question no. → 13 (or)~~

~~Focal length of Convex lens :-~~
~~f = 20 cm.~~

Question no. → (14)

Gauss theorem :- Gauss theorem stated that the net electric field linked with a surface is $\frac{1}{\varepsilon_0}$ times the net charge enclosed with that surface.

$$\phi_t = \frac{q}{\varepsilon_0} \quad \text{— (1)}$$



Let us Consider a spherical shell of radius R. +q charge is distributed along the entire range of Spherical shell.

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Again let the gaussian surface of radius r. The electric field lines are directed radially outwards.

As we know that from the Defination of electric flux :-

$$d\phi_E = \vec{E} \cdot d\vec{s}$$

$$d\phi_E = E ds \cos\theta$$

$\theta = 0^\circ$

$\cos 0 = 1$

$$d\phi_E = E ds \quad \text{— (2)}$$

Total Net flux :-

By Integrating the eqn. (2)

$$\int d\phi_E = \int E ds$$

$$\phi_E = E \int ds$$

$$\phi_E = E (4\pi r^2)$$

$$\frac{q}{\epsilon_0} = E (4\pi r^2)$$

$$E = \frac{1}{4\pi\epsilon_0} \frac{q}{r^2} \quad N \times C^{-1}$$

Let the point Charge q_0 is placed at the point on the spherical Shell.

From the relation of force and Intensity :-

$$F = \frac{E}{q_0}$$

$$F = q_0 E$$

$$F = q_0 E$$

$$F = \frac{1}{4\pi\varepsilon_0} \frac{q \cdot q_0}{q^2} \text{ Newton.}$$

This is the Coulomb's law.
Force of attraction or repulsion is equal to the product of magnitude of ~~either~~ both charges and square of distance between them (inversely proportional).

$$F \propto q \cdot q_0$$

$$F \propto \frac{1}{q^2}$$

Question no. → (15)

Electromotive.	Potential difference.
The maximum potential difference between the end of the cell in open circuit is called electro motive force.	(i) The potential difference between the two terminals of the cell in closed circuit is called potential difference.
It is exited in open circuit.	It is existed in closed circuit.
It does not depend upon the resistance of conductor.	(iii) It is dependent on the resistance of conductor.

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and depend on length and area of conductor.	It is also depend on material of conductor.
(iii) It causes the flow of current in the circuit when connected to cell	(iii) It caused due to the flow of current in the circuit.

Question no. → (16)

Given,

Power of Bulb A = P_1 = 100 watt

Power of Bulb B = P_2 = 400 watt

Voltage of both the bulb are same :-

$V_1 = V_2 = V$

Resistance = ?

We know that :-

$P = \frac{V^2}{R}$

$P_1 = \frac{V^2}{R_1}$

$R_1 = \frac{V^2}{P_1}$

$R_1 = \frac{V^2}{100}$ — (1)

$$P_2 = \frac{V^2}{R_2}$$

$$R_2 = \frac{V^2}{P_2}$$

$$R_2 = \frac{V^2}{400} \quad \text{---} (2)$$

$$\frac{R_1}{R_2} = \frac{V^2}{100} \times \frac{400}{V^2}$$

$$\frac{R_1}{R_2} = \frac{4}{1}$$

$$R_1 : R_2 = 4 : 1.$$

The resistance of the is

$$R_1 : R_2 = 4 : 1.$$

Question no. → (17)

Intrinsic Semiconductor	Extrinsic Semiconductor
Intrinsic semiconductor are pure semi conductor.	In extrinsic Semiconductor, impurities of trivalent or pentavalent impurity is added i.e, In N type Semiconductor pentavalent and In P type Semiconductor trivalent impurity is added

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		to pure Semi Conductor.
(iii)	In Intrinsic Semiconductor, electric conduction is possible due to break down of covalent bond.	(iii) In this type of semiconductor - In N type, the electric conduction is due to motion of electron and In P type Semiconductr conduction is due to holes.
(iii)	In Intrinsic Semi-Conductor the number of free electron is equal to number of free holes.	(iii) In N type Semi-Conductor, the electron are more than number of hles and In P type Semiconductor, the number of holes is more than number of electrons.
(iv)	Example of Intrinsic Semi Conductors are Pure Germanium and pure Silicon.	(iv) Example of Aluminium, Trallium Indium, arsenic, antimony etc.
(v)	The electron density is equal to hole density.	(v) In N type, electron density is more than holes

hole density and In P type semi conductor the hole density is more than electron density.

Question no. → (18) (OR)

Transformer :- Transformer is a device which is used to increase or decrease alternating voltage. It is of two types.

(1) Step up transformer
(2) Step down transformer.

Step up :- It increase alternating voltage and decrease alternating current.

Step down :- It decreases alternating voltage and increase alternating current.

Working :- It is based on mutual induction.

Principle of Transformer :-

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Let the number of turns in primary coil is Np and number of turns in secondary coil is Ns Thus the induced emf produced in both the coils are :-

$$Ep = -Np \frac{d\phi}{dt} \quad - (1)$$

$$Es = -Ns \frac{d\phi}{dt} \quad - (2)$$

$$\frac{Ep}{Es} = \frac{Np}{Ns} \quad - (3)$$

The terminal voltage of the primary and secondary coil is given as when the resistance of coil is zero.

$$Vp = Ep$$

$$Vs = Es$$

$$\frac{Vp}{Vs} = \frac{Np}{Ns} \quad - (4)$$

In the equilibrium condition the input voltage is equal to output voltage.

The current flow in primary coil is Ip and in secondary coil is Is then :-

Input Condition = Output Condition.

$$Vp \cdot Ip = Vs \cdot Is$$

$$\frac{V_p}{V_s} = \frac{I_s}{I_p} \quad \text{--- (5)}$$

from (4) and (5)

$$\frac{V_p}{V_s} = \frac{N_p}{N_s} = \frac{I_s}{I_p} = K$$

Energy loss :-

(i) Copper loss :- The coil of the transformer made of copper wire and copper has already some resistance then due to $H = I^2RT$ the energy loss is in form of electrical energy.
Reduced the Copper loss by using the thick copper wire.

(ii) Magnetic flux leakage :- The magnetic flux linked with primary coil is not associated with secondary coil of transformer there is a loss of energy in air which is called magnetic flux leakage.
It is reduced when the two coils are bound on each other.

(iii) Iron loss :- Some energy is loss due to eddy current

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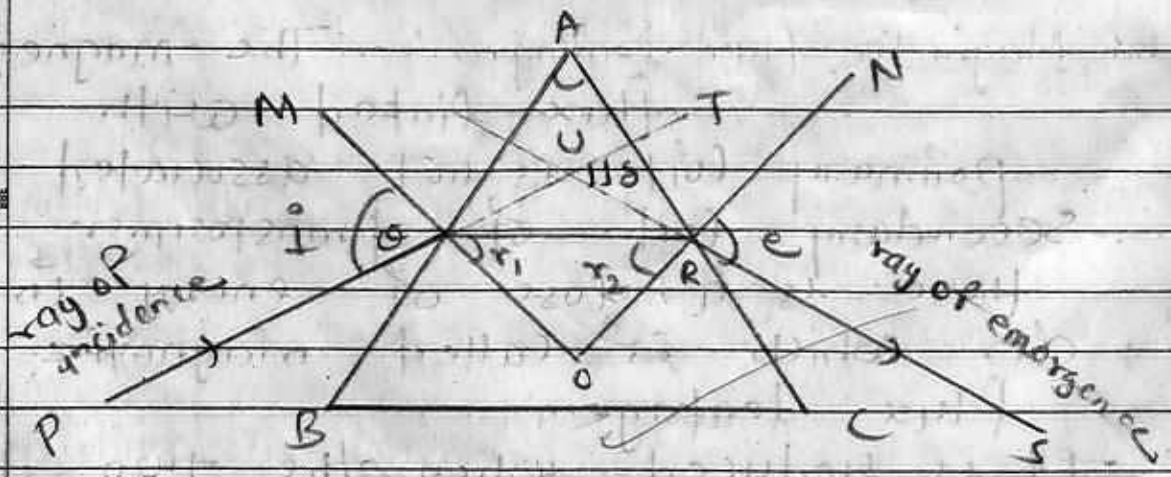
which is known as Iron loss. This loss can be reduced when using the laminated core.

(iii) Hysteresis :- This loss in form of heat and can be reduced when the coil is made up of soft iron core.

Question no. → (19)

$$\mu = \frac{\sin\left(\frac{A+\delta_m}{2}\right)}{\sin\frac{A}{2}}$$



Prism angle :- The angle subtended between ~~the incident ray and emergent ray~~ ~~is~~ the refracting surface.

of the prism is called prism angle.
$\angle A$ = Prism angle.

Minimum deviation :- The deviation of emergent ray and incident ray are called minimum deviation.

Angle of minimum deviation :- The angle of minimum deviation is that angle when the angle of deviation become minimum at certain incidence ray are called angle of minimum deviation. It is denoted by δm.

Derivation :-

Prism angle = $\angle A$

$\delta m = \angle TVS$

$\angle VOD + \angle VRD = \delta m$

$(\angle i - r_1) + (\angle e - r_2) = \delta m$

For δm :-

$i = e$

$r_1 = r_2 = r$

then,

$\delta m = 2i - 2r$ — (1)

For Cyclic Quadrilateral :-

□ AOOR :-

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$\angle AOO + \angle HKU$ ... (2)

$\angle OAR + \angle OOP = 180^\circ$ - (3)

In $\triangle OOR$:-

$\angle OOP + \angle r_1 + \angle r_2 = 180^\circ$ - (4)

From (3) and (4)

$\cancel{\angle OOP} + \angle r_1 + \angle r_2 = \cancel{\angle OOP} + \angle OAR$

$\angle r_1 + \angle r_2 = \angle OAR$

$r + r = A$

$2r = A$

$A = 2r$

$r = \frac{A}{2}$ - (5)

From (1)

$\delta_m = 2i - 2r$

$\delta_m = 2i - A$

$A + \delta_m = 2i$

$A + \delta_m = i + e$

From Snell's law :-

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

from :- $\delta_m = 2i - 2r$

$A + \delta_m = 2i$

$A + \delta_m = 2i$

$2i = A + \delta_m$

$i = \frac{A + \delta_m}{2}$ - (6)

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From eqn. (5) and (6)

$$\mu = \frac{\sin\left(\frac{A+\delta_m}{2}\right)}{\sin\frac{A}{2}}$$

proved.

For thin prism :-

$$\sin\frac{A+\delta_m}{2} = \frac{A+\delta_m}{2}$$

$$\sin\frac{A}{2} = \frac{A}{2}$$

$$\mu = \frac{\frac{A+\delta_m}{2}}{\frac{A}{2}}$$

$$2\mu = \frac{A+\delta_m}{A} \Rightarrow \mu = \frac{A+\delta_m}{A}$$

$$\boxed{\delta_m = (\mu - 1)A}$$

(1) $\delta_m \propto A$

(2) $\delta_m \propto \mu$

Question no. → (13)

Radii Curvature of focus :-
10 cm and 15 cm

$R_1 = +10\ cm$

$R_2 = -15\ cm$

Focal length of double convex lens $= 12\ cm$

$$\frac{1}{f} = (\mu - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

Refractive index of glass $= ?$

Refractive index of air $= 1$

$a\mu_g = ?$

$g\mu_a = \frac{1}{}$

$$a\mu_g = \frac{1}{g\mu_a}$$

$$\frac{1}{f} = (a\mu_g - 1)\left(\frac{1}{10} - \frac{1}{-15}\right)$$

$$\frac{1}{12} = (a\mu_g - 1)\left(\frac{1}{10} + \frac{1}{15}\right)$$

$$\frac{1}{12} = (a\mu_g - 1)\left(\frac{3+2}{30}\right)$$

$$\frac{1}{12} = (a\mu_g - 1)\left(\frac{5}{30}\right)\frac{1}{6}$$

$$\frac{1}{12} = (a\mu_g - 1)\frac{1}{6}$$

$$\frac{1}{12} = \frac{a\mu_g - 1}{6}$$

$$\frac{a\mu_g}{6} = \frac{1}{12} + \frac{1}{6}$$

$$\frac{a\mu_g}{6} = \frac{1+2}{12}$$

$$\frac{\mu_g}{6} = \frac{3}{12}$$

$$12\,\mu_g = 18$$

$$\mu_g = \frac{18}{12} \quad \frac{3}{2}$$

$$\mu_g = 3/2$$

$$\boxed{\mu_g = 1.5}$$

Thus, the refractive index of glass is 1.5.

—— " —— " ——