माध्यमिक शिक्षा मण्डल, मध्यप्रदेश, भोपाल

मु.उ.पु. 24 पृष्ठ

कार्यालयीन उपयोग के लिए

परीक्षा की नाम 2 की सील

निम्न रिक्तियों की सही प्रविष्टि परीक्षार्थी द्वारा की जाए।

1. विषय कोड 2 1 0 परीक्षा का विषय Physics

2. परीक्षा का माध्यम English परीक्षा की दिनांक 2-03-09

3. परीक्षार्थी प्रश्न पत्र का पूर्ण कोड नम्बर (सेट A, B, C,या D) अनिवार्यतः भरें — कोड U-20[illegible] सेट [illegible]

केन्द्र क्रमांक की सील 23

हायर सेकण्डरी परीक्षा

सरल क्रमांक K 3151841

4. परीक्षार्थी का अनुक्रमांक (अंग्रेजी अंकों में)

2	9	2	1	1	8	2	0	0

5. नीचे दिये प्रत्येक कालम में ऊपर दिये गये अनुक्रमांक के [illegible] क्रम में शब्दों में [illegible]

पर्यवेक्षक/केन्द्राध्यक्ष का प्रमाणीकरण

प्रमाणित किया जाता है कि परीक्षार्थी द्वारा निम्नानुसार पूरक उत्तरपुस्तिका ली गई है :–

क :– संख्या शब्दों में one अंकों में 1

ख :– परीक्षार्थी की बैठक व्यवस्था कक्ष क्रमांक 7 में है।

ग :– उत्तर पुस्तिका पर प्रश्न–पत्र का कोड नम्बर एवं सेट सही लिखा है।

BSEMP

हस्ताक्षर (पर्यवेक्षक) [illegible]

नाम [illegible] पद [illegible]

पता/संस्था [illegible]

परीक्षार्थी द्वारा ली गई सभी पूरक उत्तर पुस्तिकायें, मुख्य उत्तर पुस्तिका के साथ संलग्न हैं।

हस्ताक्षर केन्द्राध्यक्ष

प्रश्न	
1	
2	
3	
4	
1	

परीक्षार्थी, परीक्षक से अपेक्षा है कि वे पृष्ठ भाग पर दिये गये निर्देशों का यथेष्ट पालन सुनिश्चित करेंगे।

प्रमाणित किया जाता है कि उपरोक्तानुसार संलग्न पूरक उत्तर पुस्तिक [illegible] चस्पा स्थिति में यथावत् रखते हुए ही उत्तरपुस्तिका का मूल्यांकन किया गया है। सभी प्रश्नों के उत्तरों का सहज मूल्यांकन किया है। उत्तर पुस्तिका के अन्दर के अंक एवं कव्हर पृष्ठ पर दर्शाये अंक एक समान है एवं योग पूर्णतः सही है।

हस्ताक्षर (परीक्षक) 916028

परीक्षक क्रमांक

हस्ताक्षर (उपमुख्य परीक्षक)

दिनांक.....

हस्ताक्षर (मुख्य परीक्षक)

दिनांक.....

परीक्षार्थी के लिए निर्देश

1. परीक्षार्थी को अपना अनुक्रमांक/विषय/माध्यम/दिनांक एवं प्रश्न–पत्र का कोड (समूह) मुख पृष्ठ पर अंकित करना अनिवार्य है। अन्यत्र कहीं भी नहीं लिखा जाएगा।
2. अनुक्रमांक नीचे दिये गए उदाहरण अनुसार लिखा जाए :–

1	8	2	4	3	9	5	6	8
एक	आठ	दो	चार	तीन	नौ	पाँच	छः	आठ

3. उत्तर पुस्तिका के दोनों ओर पृष्ठों में लिखें। बीच में रिक्त स्थान न छोड़ें। भूल से छूटा/रिक्त स्थान तथा शेष खाली पृष्ठों को क्रास किया जाए।
4. परीक्षार्थी प्रश्न पत्र हल करते समय ही, कव्हर पृष्ठ पर दी गई तालिका में प्रश्न क्रमांक के सम्मुख वाले कालम में उत्तरपुस्तिका का वह पृष्ठ क्रमांक अनिवार्य रूप से अंकित करें जिस पर प्रश्न का उत्तर लिखा गया है। यदि पूरक उत्तरपुस्तिका का उपयोग किया गया हो, तो उस पर 25 से प्रारंभ करते हुए पृष्ठ क्रमांक परीक्षार्थी द्वारा स्वयं डाले जाएँ।

परीक्षक के लिए निर्देश

1. केवल उन्हीं उत्तरपुस्तिकाओं का मूल्यांकन करें जिन पर होलो क्राफ्ट स्टीकर चस्पा है।
2. उत्तरपुस्तिका का मूल्यांकन होलो क्राफ्ट स्टीकर को चस्पा स्थिति में यथावत् रखते हुए ही किया जाये।
3. बिना होलो क्राफ्ट स्टीकर वाली तथा फटे हुए होलो क्राफ्ट स्टीकर वाली सभी उत्तरपुस्तिकाऐं मूल्यांकन हेतु परीक्षा नियंत्रक, माध्यमिक शिक्षा मण्डल, मध्यप्रदेश, भोपाल को व्यक्तिशः रूप से भेजी जाये।

मूल्यांकन केन्द्र के लिए निर्देश

1. **O.M.R. SHEET** पर प्राप्तांक की प्रविष्टि करने हेतु केवल वही उत्तरपुस्तिकाएँ प्राप्त करें, जिनका मूल्यांकन होलो क्राफ्ट स्टीकर को चस्पा स्थिति में यथावत् रखते हुए ही किया गया है। यदि होलो क्राफ्ट स्टीकर फटा हुआ पाया जाता है तो ऐसी उत्तरपुस्तिकाऐं मूल्यांकन केन्द्र अधिकारी को पृथक से सौंपी जाएँ। ऐसे प्रकरणों के प्राप्तांकों की प्रविष्टि **O.M.R. SHEET** में नहीं की जाए। मूल्यांकन केन्द्र अधिकारी ऐसी उत्तरपुस्तिकाऐं पुनः मूल्यांकन के लिये परीक्षा नियंत्रक, माध्यमिक शिक्षा मण्डल, मध्यप्रदेश, भोपाल को व्यक्तिशः रूप से सौपेंगे।
2. उत्तरपुस्तिका के मुख्य पृष्ठ में अंकों एवं शब्दों में अंकित प्राप्तांकों को मिलान कर **O.M.R. SHEET** में अंकों की सटीक प्रविष्टि करें।
3. **O.M.R. SHEET** पर प्रमाणीकरण कर हस्ताक्षर करें।

योग पूर्व पृष्ठ + पृष्ठ क्रमांक

Q (1) (1) (ii) ϵ_0^{-1}

(2) (iv) material

(3) (ii) Gauss or Oersted

(4) (i) 10^{-6} metre

(5) (ii) ~~Faraday~~ Orsted

B S E M P (2)

(a) Two like charges ~~repel~~ each other.

(b) The potential of earth is zero.

(c) If two resistances of 2 ohms are connected in parallel then the resultant resistance will be → 1 Ω

(d) The ratio of change in output voltage to the change in input voltage is called Voltage gain.

(e) Ni - Fe cell is ~~invent~~ invented by Edison.

पृष्ठ के अंकों का योग

④ ___ +] =

या० भू० पृष्ठ — कुल अंक

Q-3 (a) False

(b) True

(c) False

(d) True.

(e) False

Q-4- (a) Optical Detector – Photo Diode

(b) Modem – Computer

(c) Pure semi-conductor – Germanium

(d) Electromagnetic waves – Transverse

(e) X-rays – 100 Å

B S E M P

Ans-5 :-

Secondary cells are those cells which can be recharge again if once they got decharged while primary cells are those which cannot be further recharged again if once they got discharged. Hence, secondary cells are superior to the primary cells.

Secondary cells are heavy in mass while that of primary cells are lighter in

mass. Primary cells are used for the small things such as in clock, remotes etc. while secondary cells which are bigger in size are used in the big things like in car battery, mobiles etc.

Due to all these reasons, ~~=~~ ry cells are superior to the ~~+~~ y cells.

ans:- * ~~The sources which are in the same phase~~

The locus of all the points which are at the equidistance from the illuminated source which are ~~of~~ in the same phase are called the coherent sources.

The necessary conditions for the light source to be coherent are given as follows -

There must be in the same phase ⇒ i.e. the phasal difference between them will be zero.

Ans-7 First Faraday's law of electromagnetism

(i) Whenever a metallic conductor is moving with varying velocity in the constant magnetic field or if a variable magnetic field is associated with the closed loop then an induced current is developed in the closed circuit.

(ii) The magnitude of the induced current in the closed loop is directly proportional to the magnetic flux associated with it.

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i.e. $\boxed{\phi \propto i}$

where ϕ is the magnetic flux and "i" is the induced current.

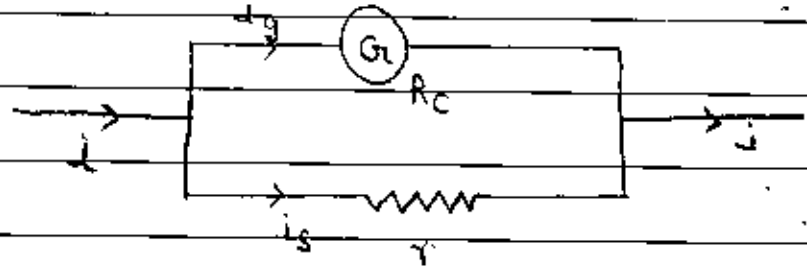
Second law :-

The direction of the induced current in the loop is such that it ~~is~~ ~~opes~~ opposes the way which produce it or which is the cause that produce it.

Ans-8 Shunt is the small resistance which keep parallel to the galvanometer which will acts as the ammeter which is used to measure the current.

If when it is joined parallel to the galvanometer then the current which flows from battery will goes from the two ways i.e one part

go to the galvanometer and the other part go through the shunt as shown in figure :



If R_c be the resistance of galvanometer and 'r' be the shunt and i be current flown ~~the~~ from battery then i_g be the current through galvanometer and i_s be the current through shunt as shunt and galvanometer are connected in parallel then voltage across them will be equal.

i.e. $i_g R_c = i_s r$

As $i_g + i_s = i$

$\Rightarrow (i - i_s) R_c = i_s r$

$i R_c = i_s (R_c + r)$

$i_s = \frac{i R_c}{(R_c + r)}$

Advantages :-

By connected shunt of low resistance parallel to the galvanometer, it is used as ammeter which is used in measurement of current.

Disadvantages :-

Shunt reduces the ~~i~~ sensitivity of the galvanometer which - leads in the error.

Ans-9 focal length of concave lens = − 25 cm

Power = $\frac{-100}{25}$ = − 4 Diopter

focal length of convex lens = + 20 cm

power = $\frac{+100}{20}$ = 5 Diopter

Resultant Power =

P_{result} = (5 − 4) Diopter Ans

F_{result} = 1 m

= 100 cm Ans

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(10) + [ ] = [ ]

योग पूर्व पृष्ठ | पृष्ठ 10 के अंक

Ans 10. According to the photo electric effect, when a light of suitable high frequency incident on the metal surface then the free electrons are ejected out from it, these electrons are called photo electrons and the eject is called the photo electric effect.

If "ν" be the frequency of the light incident on the metal surface which can cause the photoelectric effect then the energy associated with it will be $E = h\nu$

This energy when the metallic surface takes then this is partially divided into :-

(i) the minimum energy required by the metal surface to eject electrons from it is called its work function. denote by ϕ, if ν_0 be the frequency of the light ejected

(ii) a part of energy is get to incr

B S E M P

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the kinetic energy of the electron.

therefore if V is the velocity of election then

$$K.E_{max} = \frac{1}{2}mv^2$$

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

$$\Rightarrow \boxed{KE_{max} = h\nu - h\nu_0}$$

where $h\nu_0 = \phi$

$$\boxed{KE_{max} = h\nu - \phi}$$

This is the required relation ship of the Einstein's photo electric equation.

Ans- 11.

Amplitude Modulation	Frequency Modulation
The change in the amplitude modulation of the signal = keeping frequency constant	The change in the frequency of the signal received it's in the frequency modulation

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is called Amplitude modulation.

2. In this frequency may be constant

3. Amplitude may be varying due to the desirable wanting.

4. as we need we can modulate it in the higher & lower amplitude

2. In this amplitude and other may be constant

3. Frequency may be varying due to the desirable wanting.

As we need, we can modulate frequency in the high or low frequency.

Ans-12: Gauss's Theorem:

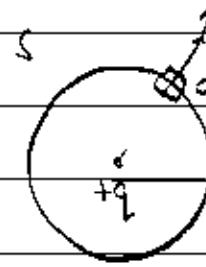
According to Gauss's theorem, the net electric flux through any closed surface containing charge is equal to the charge divided by the ϵ_0

i.e. $\phi = \frac{q_{in}}{\epsilon_0}$

where ϕ is the flux associated with any closed loop where q_{in} is the net inclosed

charge.

Derivation of Coulomb's law



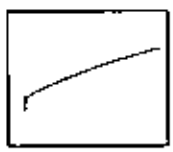
Let S be the sphere of radius 'r' and any '+q' charge is situated at its centre, Therefore the area vector and electric field are such that angle between them is zero, then the small flux associated with the small area $d\vec{s}$ is:-

$$d\phi_E = \vec{E} \cdot d\vec{s}$$
$$= E ds \cos\theta$$
$$= E ds \cos 0 \quad \text{as } \theta = 0^\circ$$

$$d\phi = Eds$$

By integrating it with the proper limit :-

$$\int_0^{\phi} d\phi = E \int ds$$



पृष्ठ के अंकों का योग

Net ⇒ $\phi = E \cdot 4\pi r^2$

Since according to gauss's law, we know net flux ~~according~~ associated with the closed loop if a charge q is placed in it will be

$$\phi = \frac{q}{\epsilon_0}$$

$$\Rightarrow \frac{q}{\epsilon_0} = E\, 4\pi r^2$$

$$E = \frac{1}{4\pi\epsilon_0} \frac{q}{r^2}$$

As we know that the force exerted by a charge is equal

$$F = q_0 E$$

where q_0 is the test charge ⇒

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$$\Rightarrow F = \frac{1}{4\pi\epsilon_0} \frac{q q_0}{r^2}$$

which is the coulomb's inverse square law.

where r is the distance between two charges q and q_0 and the constant $\frac{1}{4\pi\epsilon_0}$ has the value equal to 9×10^9 in SI unit

This is the coloumb's inverse square law of the electro-statistic, i.e the force between two charges placed between 'r' distance apart and exert force on each other, this force will be attractive if the charges are of opposite sign and this forces will be repulsive if the charges are of same sign.

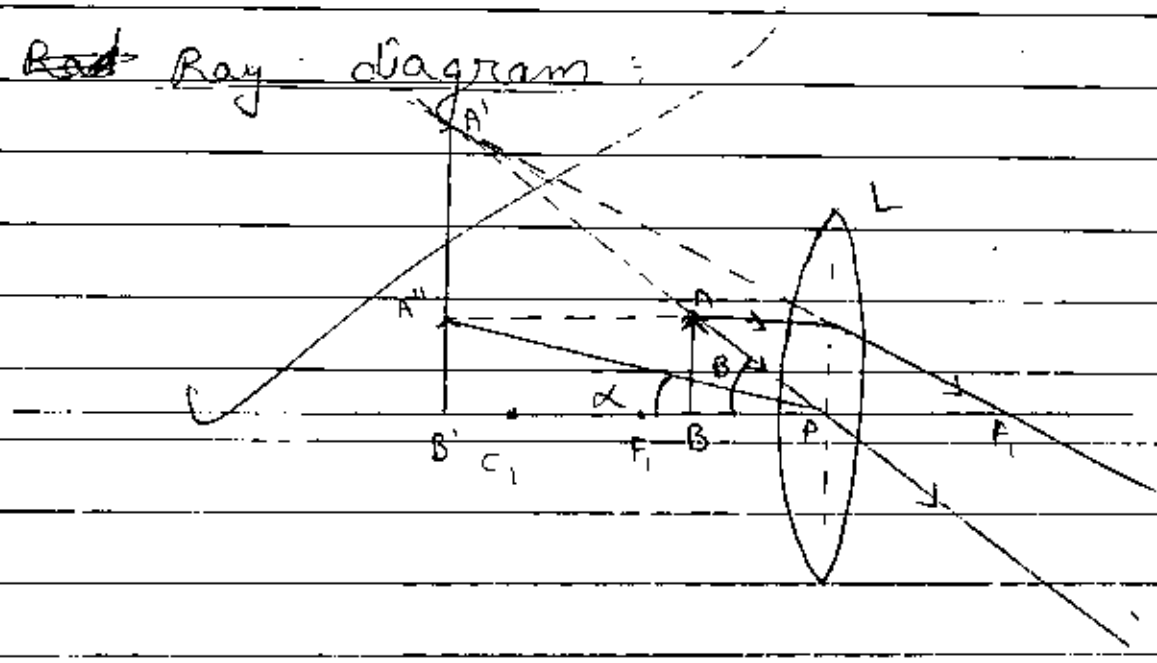
Ans-13. Simple microscope:

(a) Construction.

Simple microscope contains of a convex lens.

The basic principle of the simple microscope is that when we placed the object in between the focus and the pole of the convex lens, then the image of the object is formed magnified and virtual image.

(b) Ray diagram:



पृष्ठ के अंकों का योग

Let F_1 be the first principal focus of convex lens L with the ~~principal~~ focus pole P. Now if the object is place between the pole and the focus then its image is formed virtual and magnified.

We know magnifying power is equal to m = Visual angle of image / visual angle of object

$$m = \frac{\beta}{\alpha} \quad \text{(1)}$$

As β and α are very small, as we are dealing with paraxial rays then $\beta \simeq \tan\beta$ and $\alpha \simeq \tan\alpha$

here $\tan\alpha = \frac{A''B'}{B'P}$ — $\tan\beta = \frac{AB}{BP}$

putting in equation (1), we have

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$$m = \frac{\tan\beta}{\tan\alpha}$$

$$= \frac{AB}{PB} \times \frac{B'P}{A''B}$$

$$\boxed{m = \frac{PB'}{PB}}$$ as $AB \simeq A''B$

$$m = \frac{-D}{-v_e}$$

$$\Rightarrow \boxed{m = \frac{D}{v_e}}$$

By lens formula,

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$= \frac{1}{-D} - \frac{1}{-u}$$

$$\Rightarrow \frac{1}{u} = \frac{1}{f} + \frac{1}{D}$$

$$\Rightarrow m = D\left(\frac{1}{D} + \frac{1}{f}\right)$$

$$\boxed{m = \frac{1 + D}{f}}$$

In case, when image is formed at ∞ i.e. Infinity, then the object will be at focus

$$\Rightarrow v = f$$

$$\therefore \boxed{m = \frac{D}{f}}$$

This is all about the simple microscope.

Working :-

Ans-14 The device used to convert alternating current into direct current is known as rectifier.

It works on the principle that, we know alternating current has both the positive and negative half cycles, therefore when we placed a P-N junction diode to it then when, it is ~~forward~~ forward biasing then the ac shows the low resistance in one direction therefore allow the current to flow and when it is negative half cycle occurs in ac then it acts as the reversed biasing then it offers very high resistance in the opposite direction, therefore does not allow the current to flow through it, therefore the negative ~~half~~ half cycle does not allow the current to flow and hence, there is

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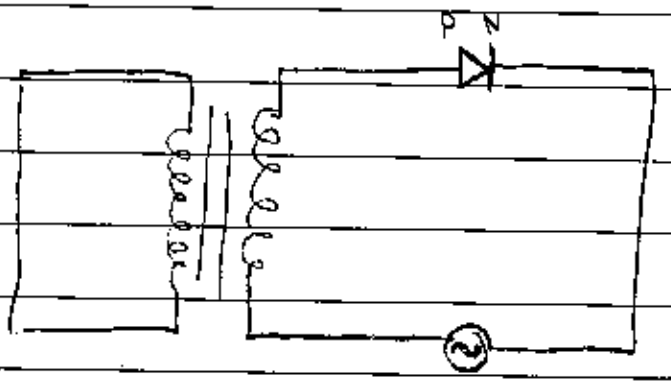
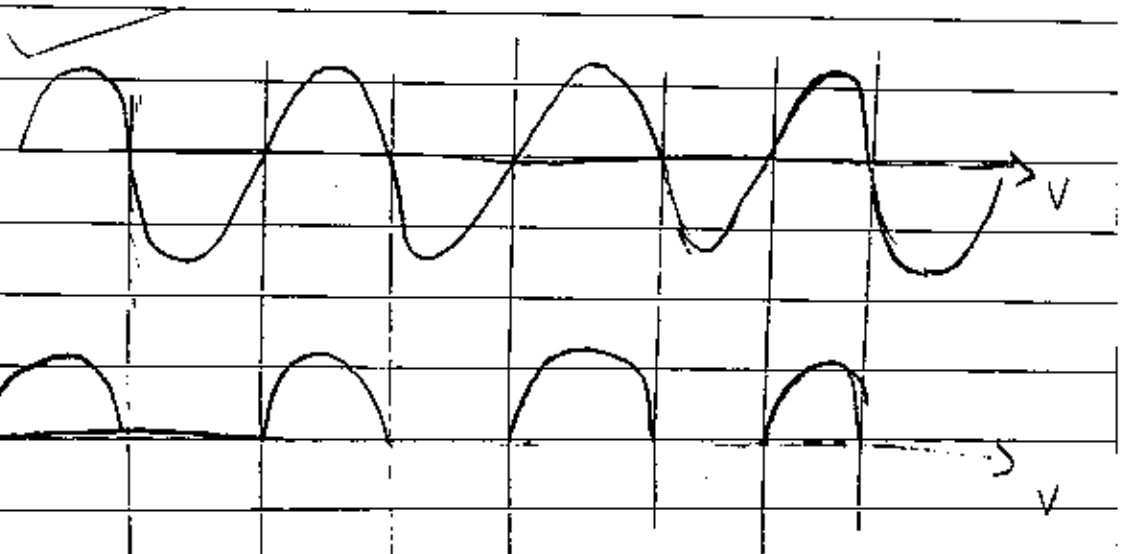
current in only one direction they are ~~is it acts as~~ it provides a d c current i.e. in only one direction, this is the principle of the rectifier.

~~Block diagram~~

Labelled diagram :-





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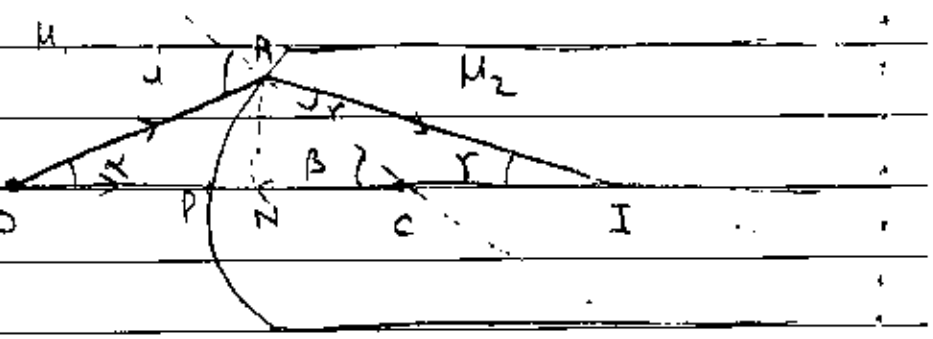
पृष्ठ के अंकों का योग

If ΔV_{output} be the change in output voltage and ΔV_{input} be the change in input voltage, then the voltage gain will be give by

$$\frac{\Delta V_{out}}{\Delta V_{inp}}$$

The positive half cycle gives the voltage but the negative half cycle resist it thus we get dc current or voltage whatever we want

Ans 15



$\mu_2 > \mu_1$

5

पृष्ठ के अंकों का योग

Let the spherical surface be of centre of C and an object is placed at O and its image is formed at I and μ_1 and μ_2 are the refractive indices outside and inside the surface where μ_2 is greater than μ_1, hence the incident ray gets bend towards the normal after the refraction at the spherical surface, hence by the figure By applying snell's law on it :- , we have

$$\mu_1 \sin i = \mu_2 \sin r \quad \text{— (1)}$$

As we have $\beta = r + \gamma$ — (IV)

{as the exterior angles of Δ}

and $i = \alpha + \beta$ — (III)

Since i and α, β, γ are small angles

therefore $i \approx \tan i$ $\alpha \approx \tan\alpha$

$\beta \approx \tan\beta$ $\gamma \approx \tan\gamma$

$$\tan\alpha = \frac{AN}{ON}, \quad \tan\beta = \frac{AN}{NC}, \quad \tan\gamma = \frac{AN}{NI}$$

As $N \approx P$

$$\Rightarrow \tan\alpha = \frac{AP}{OP}, \quad \tan\beta = \frac{PA}{PC}, \quad \tan\gamma = \frac{AP}{PI}$$

As from (II) and (III)

$$\beta = \alpha + \gamma$$

$$\Rightarrow \alpha = \beta - \gamma$$

$$= \tan\beta - \tan\gamma$$

$$\alpha = \frac{AP}{PC} - \frac{AP}{PI} \quad \text{— (IV)}$$

and $i = \alpha + \beta$

$$= \tan\alpha + \tan\beta$$

$$= \frac{AP}{OP} + \frac{PA}{PC} \quad \text{— (V)}$$

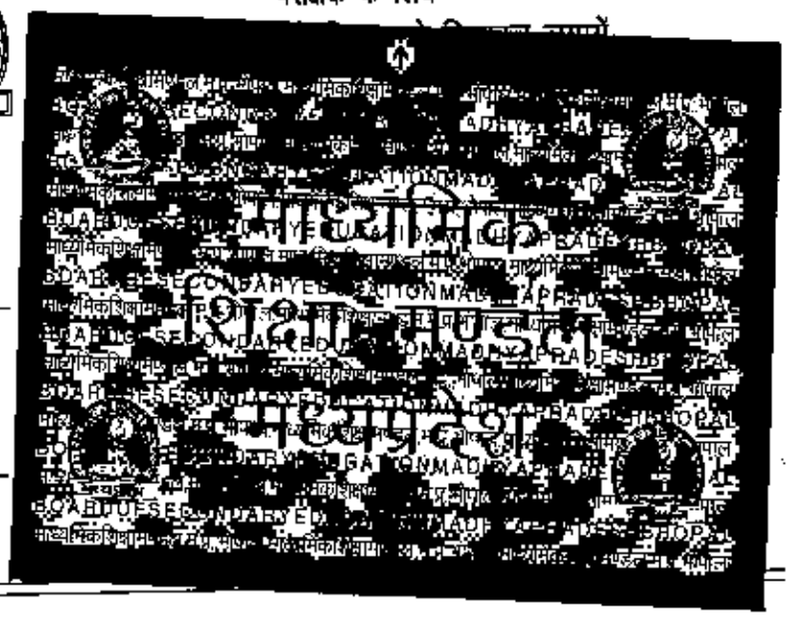
B S E M P

[ ]
पृष्ठ के अंकों का योग

माध्यमिक शिक्षा मण्डल, मध्यप्रदेश, भोपाल

परीक्षक के लिये

1. केन्द्र की सील .....
2. पर्यवेक्षक के हस्ताक्षर व दिनांक
3. केन्द्राध्यक्ष के हस्ताक्षर की सील
4. केन्द्र क्रमांक
6. परीक्षा का नाम
7. विषय 8. माध्यम
8. दिनांक



पृष्ठ

BSEMP

Put the value of (iv) and (v) in eqn (i)

as $\mu_1 \sin i = \mu_2 \sin r$

as i and r are small angles, we have

$\mu_1 i = \mu_2 r$ $\quad \because \sin i \approx i$, $\sin r \approx r$

$$\Rightarrow \mu_1 \left(\frac{AP}{OP} + \frac{AP}{PC}\right) = \mu_2 \left(\frac{AP}{PC} - \frac{AP}{PI}\right)$$

$$\Rightarrow \mu_1 \left(\frac{1}{OP} + \frac{1}{PC}\right) = \mu_2 \left(\frac{1}{PC} - \frac{1}{PI}\right)$$

as $OP = -u$; $PC = R$, $PI = v$

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Therefore, we have :

$$\mu_1\left(\frac{1}{-u}+\frac{1}{R}\right)=\mu_2\left(\frac{1}{R}-\frac{1}{v}\right)$$

$$\Rightarrow \frac{\mu_2}{v}-\frac{\mu_1}{u}=\frac{\mu_2}{R}-\frac{\mu_1}{R}$$

$$\Rightarrow \boxed{\frac{\mu_2}{v}-\frac{\mu_1}{u}=\frac{\mu_2-\mu_1}{R}}$$

If we resolve in it $\frac{\mu_2}{\mu_1}=\mu$, we have

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

This is the required relation ship for the ~~conf~~ convex spherical mirror hence proved.

Ans 16 Let L_1 and L_2 be two inductance of turns n_1 and n_2 per unit length respectively. And both have the cross sectional area same i.e. A. Therefore, magnetic field due to inductance 1, be $B_1 = \mu_0 n_1 I_1$ and due to 2nd $B_2 = \mu_0 n_2 I_2$ where I_1 and I_2 are the current through the coil 1 and 2 respectively and the magnetic flux associated with 2 due to (1) will be.

$$\phi_{21} = B_2 A.$$

$$\phi_{21} = \mu_0 n_2 I_2 A$$

and $\phi_{12} = B_1 A$

$$= \mu_0 n_1 I_1 A$$

and the mutual inductance

$$M_{21} = \frac{\phi_{21}}{I_2}$$

and

$$M_{21} = \mu_0 n_1 n_2 I I_2 A \quad (1)$$

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and $M_{12} = \mu_0 n_1 n_2 l_1 l_2 A$ — (11)

⇒ From (1) and (11)

$M_{12} = M_{21}$

which is known as reciprocity theorem.

Serenity Mind