2009 माध्यमिक शिक्षा मण्डल, मध्यप्रदेश, भोपाल

मु.उ.पु. 24 पृष्ठ

कार्यालयीन उपयोग के लिए

निम्न रिक्तियों की सही प्रविष्टि परीक्षार्थी द्वारा की जाए।

परीक्षा के नाम की सील: H. S. S. C.

1. विषय कोड 2 1 0 परीक्षा का विषय Physics

2. परीक्षा का माध्यम English परीक्षा की दिनांक 02/03/09

केन्द्र क्रमांक की सील: केन्द्र क्र. 732002

3. परीक्षार्थी प्रश्न पत्र का पूर्ण कोड नम्बर (सेट A, B, C,या D) अनिवार्यतः भरें — कोड U-2043 सेट D

स्टीकर तीर के निशान से मिलाकर लगायें

परीक्षार्थी का अनुक्रमांक (अंग्रेजी अंकों में)

2	9	7	3	1	9	8	6	8

नीचे दिये प्रत्येक कालम में ऊपर दिये गये अनुक्रमांक के अंकों को उसी क्रम में शब्दों में लिखा जाए :–

Two	Nine	Seven	Three	One	Nine	Eight	Six	Eight

पर्यवेक्षक / केन्द्राध्यक्ष का प्रमाणीकरण

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

क :– संख्या शब्दों में X अंकों में X

ख :– परीक्षार्थी की बैठक व्यवस्था कक्ष क्रमांक 09 में है।

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

BSEMP

हस्ताक्षर (पर्यवेक्षक) Agrawal

नाम Archana Agrawal पद Teacher

पता / संस्था Govt. Nirinraj H. S. School

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

हस्ताक्षर केन्द्राध्यक्ष

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
कुल प्राप्त	

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 पुस्तिकाओं चस्पा स्थिति में यथावत् रखते हुए ही उत्तरपुस्तिका का मूल्यांकन किया गय पुस्तिका के अन्दर के अंक एवं कव्हर पृष्ठ पर दर्शाये अंक एक समान

हस्ताक्षर (परीक्षक)

परीक्षक क्रमांक 933012

हस्ताक्षर (उपमुख्य परीक्षक)

दिनांक.....

दिनांक 16-3-09

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 छोडें। 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 सौपी 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।

Que-1

1 (A) Ans (ii) ε_0^{-1}

1 ~~(B)~~ (B) Ans (iv) Material

1 (C) Ans (ii) Gauss or Oersted.

(D) Ans

1 (E) Ans (iv) Oersted

Que 2

1 (a) Repel

1 (b) Zero

1 (c) 1 ohm

1 (d) Voltage gain.

(e) Edison

1

C 3

Que 3

(a) False

(b) False

(c) False

(d) True

(e) False

Que 4

(a) Optical detector — Photo diode

(b) Modem — Computer

(c) Pure semiconductor — Germanium

(d) Electromagnetic waves — Transverse

(e) X-rays — 100 Å

BSEMP

Que5

Sol:- Secondary cell is superior than Primary cell because:-

(i) Secondary cells is large & heavy than primary cell.

(ii). Secondary cell can be rechaaged & can be reused again but primary cell can't be reused once they are discharged.

(iii) Internal resistance of secondry cell is less as compared to primary cell.

) Secondry cell are more efficient as compared to primary cell.

Que 7

Sol:- Faradays laws of Electromagnetic induction are:-

1st law:- Whenever there is a change in magnetic flux associated with a body, an e.m.f is induced in the body. & This induced em.f exists b. until the magnetic flux is changed.

2nd law:- The induced e.m.f is directly

proportional to the rate of change of flux.

i.e $e = -\frac{d\phi}{dt}$

(−) Sign indicates that the e.m.f induced opposes the change in flux.

Que 8

Sol:- Shunt is a wire of low resistance which is connected in parallel to the Galvanometer.

Use:- Shunt is used to convert galvanometer into ammeter. It is also used to convert a galvanometer into voltmeter.

Advantages of Shunt:-

(i) It does not draw any current from the circuit, therefore correct reading can be obtained.

(ii) With shunt good quality ammeter & voltmeter can be obtained.

Disadvantages:-

(i) Shunted ammeter is less sensitive.

(7):

Que 9

Sol:- focal length of convex lens (f_1) = 20 cm (By Sign convention)

focal length of concave lens = −25 cm (by sign convention)

Resultant Focal length (F) is equal to

$$\frac{1}{F} = \frac{1}{f_1} + \frac{1}{f_2}$$

$$= \frac{1}{20} + \frac{1}{(-25)}$$

$$\frac{1}{F} = \frac{1}{20} - \frac{1}{25} \therefore$$

$$\frac{5-4}{100}$$

$$\frac{1}{F} = \frac{1}{100} \text{ cm}$$

$$F = 100 \text{ cm} = 1 \text{ m}$$

$$\text{Power} = \frac{1}{F}$$

$$\text{Power} = \frac{1}{1} = 1 \text{ D}$$

पृष्ठ के अंकों का योग

BSEMP

Que 10

Sol:- Einstein explained the photo-electric effect by Planck's quantum theory.

He explained that when a photon of light of energy $h\nu$ (where h = planck's constant & ν is frequency) falls on a metal surface, photoelectrons are ejected. This energy is used in two ways:-

(i) Some part of energy is used to excite the photo electrons

(ii) And the other part is used to provide kinetic energy to them.

If ν_0 = Threshold frequency

v_m = maximum velocity of electron

m = mass of electron, then

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

$$\Rightarrow \frac{1}{2}mv_m^2 = h\nu - h\nu_0$$

$$\Rightarrow \boxed{\frac{1}{2}mv_m^2 = h(\nu - \nu_0)}$$

This is Einsteins photo electric equation

BSEMP

Que 12

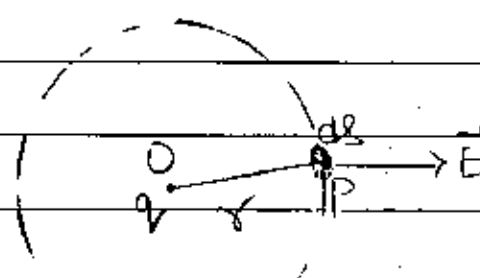
Sol:- Gauss's theorem:- The electric flux associated with a body is equal to $\frac{1}{\varepsilon_0}$ times the charge enclosed in it.

i.e. $\phi_E = \frac{q}{\varepsilon_0}$

where ε_0 is permittivity of free space

Derivation of Coulomb's inverse square law by Gauss's theorem:-

Let a charge q is placed at point O. A point P is taken at a distance r from O. A sphere of radius r is drawn from O, & therefore point P will lie on the sphere. Therefore this surface will act as a Gaussian surface. A small area $d\vec{s}$ is taken at P, from which Electric field is passing. The direction of $\vec{E}$ is radially outwards.



Now, the flux associated with q is,

$$d\phi_E = E \cdot ds$$

$$= E\,ds\cos\theta$$

$$= E\,ds\cos 0^\circ \quad (\because \theta = 0^\circ)$$

$$d\phi_E = E\,ds$$

पृष्ठ के अंकों का योग

Total flux associated with Sphere; = ϕ

$$\phi_E = \int d\phi_E = \int E\, dS$$

$$= E \int dS$$

$$= E S$$

$$\phi_E = E\, 4\pi r^2 \quad (S = 4\pi r^2 \text{ for sphere}) \quad \text{---(1)}$$

Also By Gauss's theorem;

$$\phi_E = \frac{q}{\varepsilon_0} \quad \text{---(2)}$$ where ε_0 is permittivity of free space

From (1) & (2)

$$\frac{q}{\varepsilon_0} = 4\pi r^2 E = \frac{q}{\varepsilon_0}$$

$$E = \frac{q}{4\pi r^2 \varepsilon_0}$$

Now, Force due to a charge q_0 is

$$F = q_0 E$$

$$= \frac{q_0 q}{4\pi r^2 \varepsilon_0}$$

$$\boxed{F = \frac{1}{4\pi\varepsilon_0} \frac{q q_0}{r^2}}$$

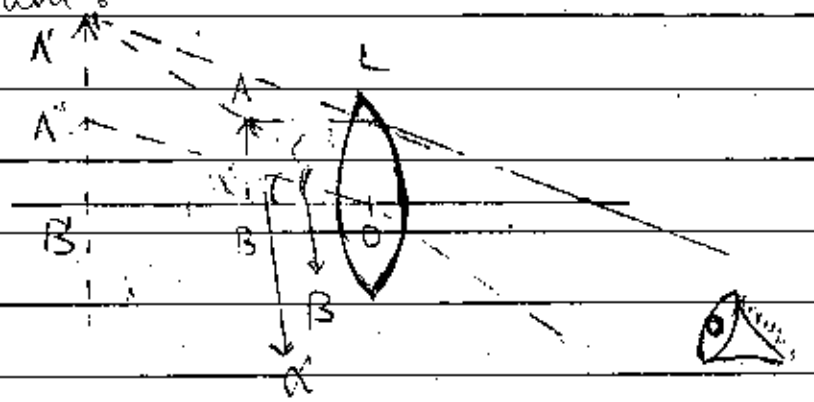
Which is coulomb's inverse square law

Que 13

Sol:- Simple microscope

(a) Construction :- It consists of a convex lens L. When an object is placed ~~between~~ beyond Focus of lens, a virtual, erect & enlarged magnified image is formed. An object AB is placed beyond focus of lens whose virtual, erect & magnified image A'B' is formed. ~~The distance of~~ The least distance of distinct vision is D

(b) Ray diagram :-



(c) expression for magnifying power :-

let An object AB is placed between F & optical centre.

magnifying power = $\frac{\text{Virtual angle of image}}{\text{virtual angle of object when placed at least distance of distinct vision.}}$

(12) c + [ ] = पृष्ठ 12 के अंक

Visual angle of image = $\angle A'OB' = \beta$

Visual angle of object when placed at least distance of distinct vision = $\angle A''OB' = \alpha$

But $\angle A'OB' = \angle AOB = \beta$ ∴

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

∵ α, β are very small

$\therefore \alpha \simeq \tan\alpha$ & $\beta \simeq \tan\beta$

$\therefore m = \frac{\tan\beta}{\tan\alpha}$ — (1)

In $\triangle AOB$, $\tan\beta = \frac{AB}{OB}$ — (2)

In $\triangle A''OB'$

$\tan\alpha = \frac{A''B'}{OB'}$

But $A''B' = AB'$ (object)

$\therefore \tan\alpha = \frac{AB}{OB'}$ — (3)

∴ From (1) & (2) & (3)

$m = \frac{\frac{AB}{OB}}{\frac{AB}{OB'}} = \frac{OB'}{OB}$

[ ]

पृष्ठ के अंकों का योग

BSEMP

By sign convention

$OB = -u$

$OB' = -D$

$$\therefore \boxed{m = \frac{-D}{-u} = +\frac{D}{u}} \quad \text{---} (4)$$

Case I :- When image formed at least distance of distinct vision

By lens formula;

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

By sign convention

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

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

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

Multiplying by D,

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

$$\therefore \boxed{m = \frac{D}{f} + 1} \quad \text{(from (4))}$$

Case II :- When image formed at infinity

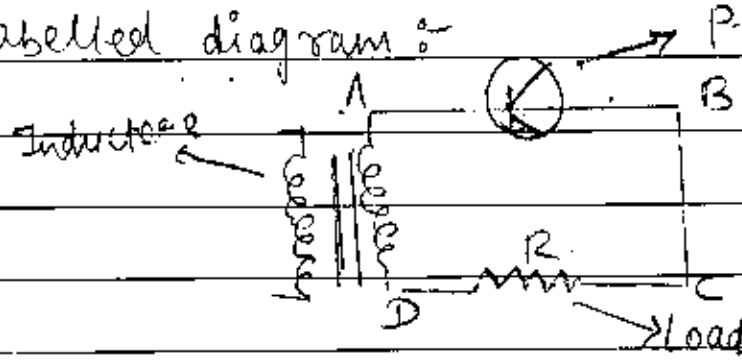
$\therefore v = \infty \quad \left(\because \frac{1}{v} = \frac{1}{f} - \frac{1}{\infty} = 0\right)$

$$m = \frac{D}{f}$$ (from (1))

Que 14

Sol :- Rectifier is a device which converts alternating current into direct current.

(a) Labelled diagram :-



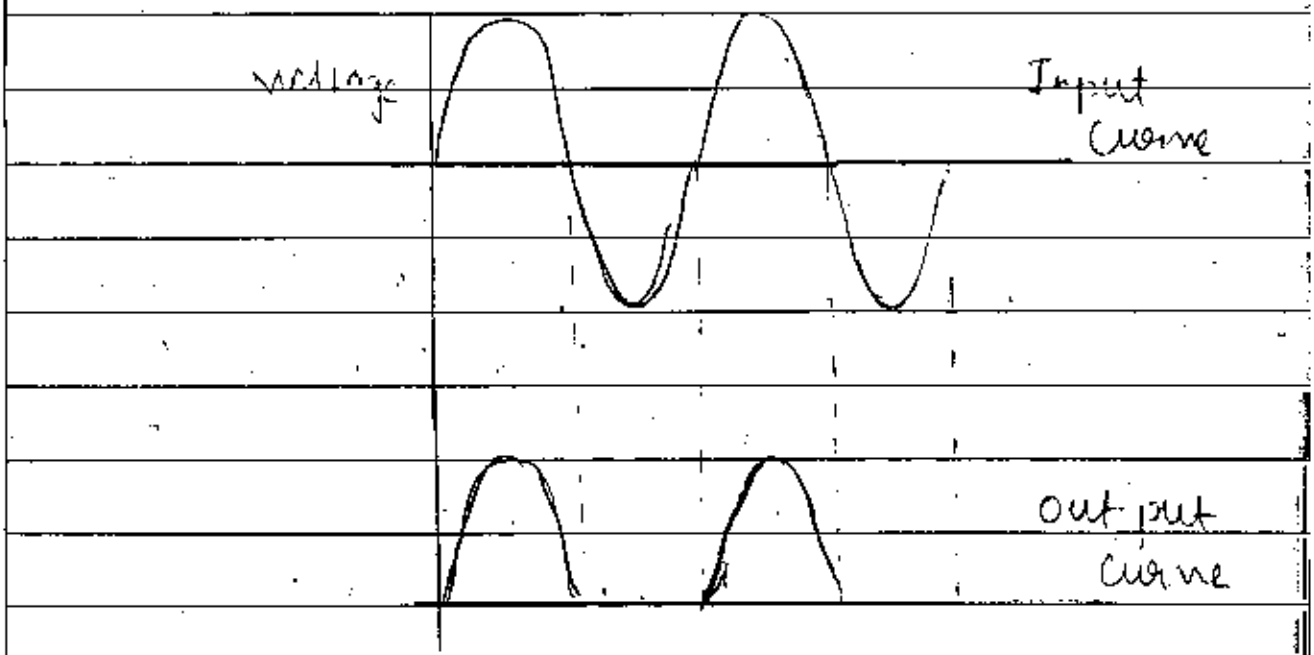
(b) Working :- Let in one half cycle A is at positive potential with respect to B. Therefore P-N diode will act as ~~half~~ forward biased & current is flown in R ~~th~~ from C to D.

Now in next half cycle, A is at negative terminal with respect to B, therefore P-N diode will become reverse biased & no current will flow through R.

पृष्ठ के अंकों का योग

This process repeated continuously. In this way, it converts only one half cycle of a.c. to d.c. & thus act as half wave rectifier.

(c) Input & Output voltage curve :-



Que 15 :

Sol :- Lens maker formula = $\frac{1}{f} = (\mu - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

where f is focal length of lens,

μ is refractive index of surrounding medium lens.

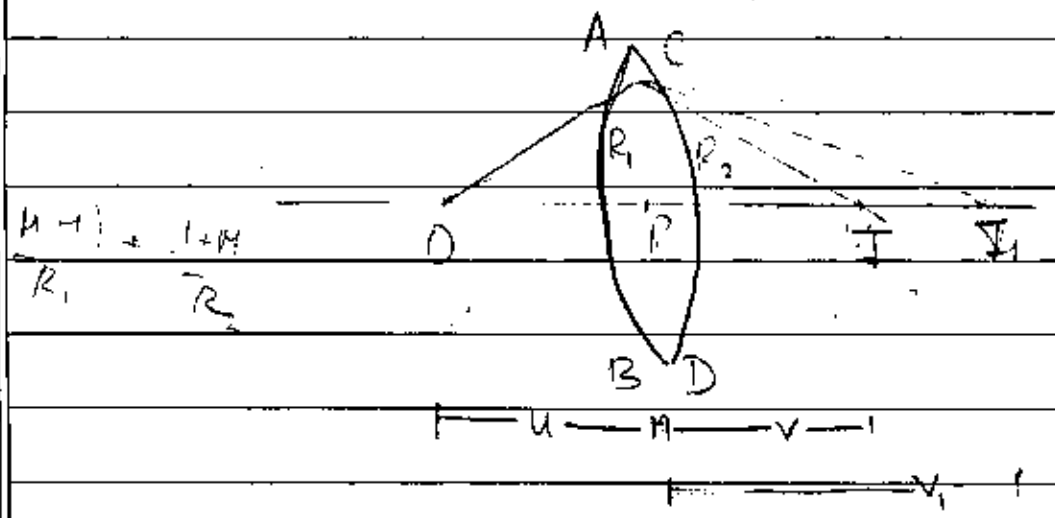
R_1 = Radius of curvature of 1st surface

R_2 = Radius of curvature of second surface.

BSEMP

पृष्ठ के अंकों का योग

Derivation for thin lens:-



Let a thin lens made up of two spherical refracting surfaces AB & CD with radii of curvatures R_1 & R_2 resp. An object is placed at O, whose image has to be formed at I, but due to refraction at surface CD, it forms at I_1.

∴ Therefore I_1 acts as virtual object for CD. μ is the refractive index of medium.

By sign convention

$OP = -u$

$PI = +v$

$PI_1 = v_1$

For surface AB

$$\frac{\mu}{v_1} - \frac{1}{-u} = \frac{\mu - 1}{R_1}$$

$$\frac{\mu}{v_1} + \frac{1}{u} = \frac{\mu - 1}{R_1} \quad \text{---(1)}$$

For Surface CD

$$\frac{\mu}{v} - \frac{1}{v_1} = \frac{\mu - 1}{R_2}$$

$$\frac{1}{\mu v} - \frac{1}{v_1} = \frac{\frac{1}{\mu} - 1}{R_2}$$

{ Since light going from denser to rarer medium

Multiplying by μ,

$$\frac{1}{v} - \frac{\mu}{v_1} = \frac{1 - \mu}{R_2} \quad \text{---(2)}$$

(2) + (1),

$$\Rightarrow \frac{1}{v} - \frac{1}{u} = \frac{\mu - 1}{R_1} + \frac{(1 - \mu)}{R_2}$$

$$\frac{1}{v} - \frac{1}{u} = (\mu - 1)\left[\frac{1}{R_1} - \frac{1}{R_2}\right] \quad \text{---(3)}$$

By lens formula;

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f} \quad \text{---(4)}$$

∴ From (3) & (4)

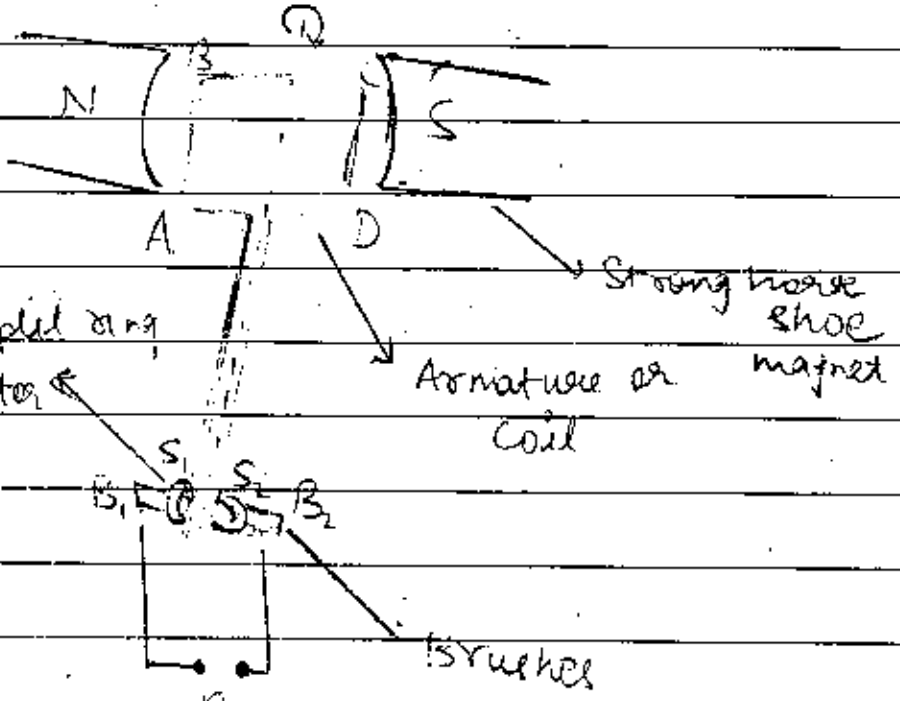
$$\frac{1}{f} = (\mu - 1)\left[\frac{1}{R_1} - \frac{1}{R_2}\right]$$

पृष्ठ के अंकों का योग

Que 16

Sol:- D.C. dynamo

(a) Labelled diagram :-



(b) Construction :- It consists of four main parts :-

(i) Magnet NS :- It is a strong horse shoe magnet or electromagnet. Current is supplied through this magnet.

(ii) Armature or Coil ABCD :- It is a copper insulated coil which rotates in clockwise direction. It is then rotated by an angle

(iii) Split ring commutator :- It is a copper (S_1S_2) or brass ring

splitted into 2 parts. The ends of coil are joined to it.

(iv) Brushes $B_1 B_2$:- They are carbon rods kept against the split rings. They are fixed and dont rotate. The current to the external circuit is supplied through $B_1 B_2$.

(c) Principle :- It works on principle of ~~electromagnetic~~ mutual induction, that whenever a current is passed through primary coil an emf a current is induced in secondry coil placed nearby of it.

(d) Working :- let in first half cycle plane of AB is parallel to magnetic lines of force. The coil is rotated in a clockwise direction. Due to this AB comes up to the plane of paper & CD goes down to the plane of paper. Therefore by Fleming's right hand rule, direction of induced current is along ABCD $S_2 B_2 R B_1 S_1$

Now in next half cycle, B_1 is connected to S_1 & B_2 to S_2. In this cycle CD comes up to the plane of paper & AB goes down. By Fleming's right hand rule, direction of induced current is along

$B_1 RB_1$ again.

This process is repeated continuously & thus a ~~direct~~ d.c. is produced.

Que 11

Amplitude Modulation (AM)	Frequency modulation (FM)
i) It is more noisy & unclear	It is less noisy & clear
~~(ii) It is more unclear.~~	~~It is clear.~~
(ii) Very small power is used for modulation	Large power is used in ~~no~~ for modulation
(iii) Takes small gap in modulation	Takes large gap in modulation
iv) Modulated wave is ~~kept~~ superimposed with carrier wave ~~is~~ of higher amplitude	Modulated wave is superimposed with carr

B
S
E

Qu:6 Coherent sources are those sources which have same frequency & const. or zero phase difference

Conditions :-

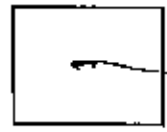
i) Frequency should be same for sources

ii) Their phase difference must be zero or constant.

योग पूर्व पृष्ठ + पृष्ठ 22 के अंक = कुल अंक

B
S
E
M
P

पृष्ठ के अंकों का योग

योग पूर्व पृष्ठ +  = कुल अंक

पृष्ठ 23 के अंक

BSEMP

पृष्ठ के अंकों का योग

योग पूर्व पृष्ठ | पृष्ठ 24 के अंक | कुल अंक

BSEMP

पृष्ठ के अंकों का योग