केवल मूल्यांकनकर्ता के उपयोग हेतु!

माध्यमिक शिक्षा मण्डल, मध्यप्रदेश, भोपाल

32 पृष्ठीय

केवल परीक्षक द्वारा भरा जावे। प्रश्न क्रमांक के सम्मुख प्राप्तांकों की प्रविष्टी करें।

प्रश्न क्रमांक	पृष्ठ क्रमांक	प्रश्न	पृष्ठ	प्राप्तांक (अंकों में)
1		17		
2		18		
3		19		
4		20		
5		21		
6		22		
7		23		
8		24		
9		25		
10		26		
11		27		
12		28		
13				
14				
15				
16				

परीक्षक एवं उपमुख्य परीक्षक द्वारा भरा जावे →

प्रमाणित किया जाता है कि अन्दर के पृष्ठों के अनुरूप मुख्य पृष्ठ पर अंकों का प्रविष्टी एवं अंकों का योग सही है।

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

उप मुख्य परीक्षक के हस्ताक्षर एवं निर्धारित मुद्रा

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Ques = 01

(a.) 6.25×10^{18} electrons.

(b.) Tangent

(c.) Transverse

(d.) Interference

(e.) 90°

(f.) Short focal length

Ques 02

(a.) (ii.) Electrons

(b.) (iii.) One

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(c.) (ii) Magnetic and electric fi th

(d.) (ii) Law of conservation of charge

(e) (i.) Photoelectric effect

(f) (iv.) Henrich Hertz

Ques=03

(a.) Mathematical form of quantisation of electric charge is :-

$$q = \pm ne$$

where, n = no. of electrons = $1, 2, 3 \text{---} n$

$e = 1.6 \times 10^{-19}\ C$

(b.) Degree of order of frequency of light is :-

$\Rightarrow 10^{14}\ m$

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(c) Power = $\frac{1}{\text{focal length}}$

Given, $f = +0.5\,m$

$P = \frac{1}{0.5}$

$P \Rightarrow +2$ diopter.

S.I. unit of mutual inductance is:- Henry.

Root mean square value of alternating current is:-

$I_{rms} = \frac{I_0}{\sqrt{2}}$

where, I_0 = peak value of alternating current.

Ques=04

a.) Intensity of light (iv) Number of photons

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b.) Frequency of light — (iii) Frequency of photon
c.) Work function — (i) Minimum energy to emit electrons from surface
d.) Matter waves — (v) Moving particle.
e.) Threshold frequency — (ii) Minimum frequency to emit electrons from surface
f.) Particle nature of light — (vii) Einstein

Ques = 05

(a.) True
(b.) True
(c.) False
(d.) False
(e.) True

Ques = 06

Polarised light	Unpolarised light
(1.) In polarised light, each particle of light vibrates in same ~~phase~~ plane.	(1.) In Unpolarised light, particles do not vibrate in same plane.

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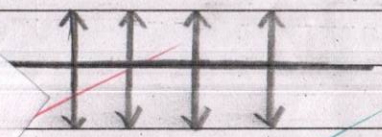
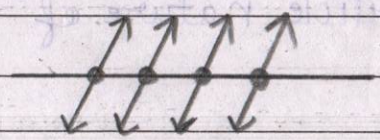
(2.) Polarised light wave can be obtained from unpolarised ray by the process of polarisation using analyzer & polaroid.



(3) Unpolarised wave light cannot be obtained from polarised light wave.



Ques=07

Transformer is a device to increase or decrease the voltage.

The core of transformer is made up of soft iron, which reduce hysteresis loss.

Core of transformer is laminated to reduce the Eddy currents that formed in the core of transformer and hence reduce the Iron loss.

Core is also laminated to increase the

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efficiency of working of transformer.

Ques= 08

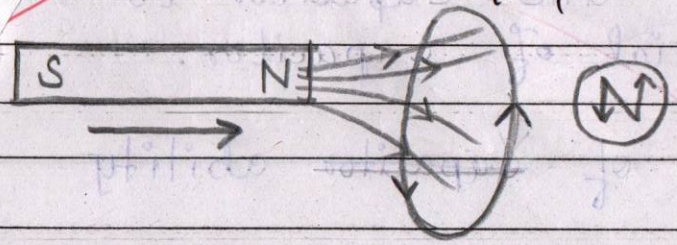
LENZ'S LAW :-

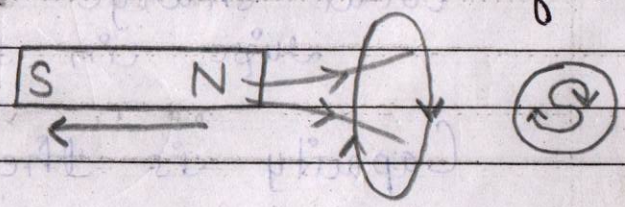
According to this law of electromagnetic induction, the direction of induced emf or induced current is such that it tends to oppose the cause which produces it.

i.e. change in magnetic flux is the cause to induce emf / current and it opposes this change.

such that if the current increases then the emf is induced in reverse direction and if current decreases then emf is induced in same direction.

This law is based on conservation of energy.





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Given - emf = 12 V

$r = 0.4\ \Omega$

$I = ?$

$$I = \frac{emf}{\text{Total Resistance}} = \frac{E}{r+R}$$

For the current to be maximum, external resistance has to be zero. $R=0$

$$I = \frac{12}{0.4}$$

$I = 30$ Ampere.

Ques = 10

Capacity of a capacitor is defined as the total charge given to the capacitor to rise in the potenti[illegible] capacitor.

Capacity is the mea[illegible] of ~~capacitor~~ ability

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of capacitor to hold the charge.

S.I. unit = Farad (F)

It is scalar quantity.

Formula = $C = \frac{Q}{V}$

B S E

Ques = 11

Intrinsic Semiconductor	Extrinsic Semiconductor
(1.) Pure semiconductors without any impurity is known as intrinsic semiconductor.	(1.) Trivalent or pentavalent impurity in pure semiconductors results in extrinsic semiconductor.
(2.) In intrinsic semiconductors, electron and holes density same.	(2.) In N-type extrinsic semiconductor electrons are major charge carriers, and in P-type extrinsic semiconductor, holes are major charge carriers.
Ex:- Si and Ge.	Ex:- Si with Al impurity. Si with P impurity.

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Ionization Energy :-

Ionization energy is defined as the ~~ene~~ mount of energy required by an electron to come out ~~complety~~ completely out of atom.

⇒ It is also defined as the energy required to emit an electron out of atom.

For hydrogen atom,

$$I.E. = E_\infty - E_1$$
$$= 0 - (-13.6)$$
$$\Rightarrow +13.6 \text{ eV}$$

Ques = 13

Let P and R are be two plane circular coils. N_1 and N_2 are number of turns in them respectively 'A' is the area of coils and current is flowing through them.

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We know, magnetic field due to circular

$$B_1 = \frac{\mu_0 I N_1}{2 r_1} \quad \text{—— (i.)}$$

Now, magnetic flux linked with secondary coil due to current in primary coil is :-

$$\phi_B = B_1 \times N_2 A$$

$$\Rightarrow \frac{\mu_0 N_1 I}{2 r_1} \times N_2 A \qquad \text{By eq (i.)}$$

$\{A = \pi r^2\}$

$$\phi_B \Rightarrow \frac{\mu_0 N_1 N_2 I \pi r_2^2}{2 r_1} \quad \text{—— (ii.)}$$

Now, the mutual inductance will be :-

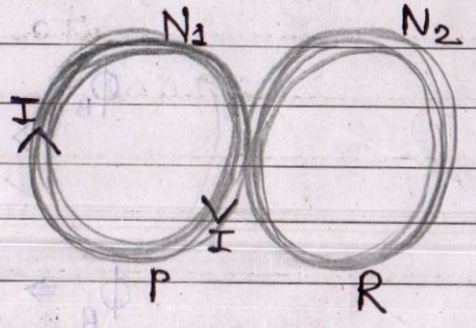
$$M = \frac{\phi}{I}$$

$$M = \frac{\mu_0 N_1 N_2 I \pi r_2^2}{2 r_1 I} \qquad \{\text{By eq (ii.)}\}$$

$$\boxed{M = \frac{\mu_0 N_1 N_2 \pi r_2^2}{2 r_1}} \Rightarrow \text{This is required expression}$$

permeability μ_r is placed in core then,

$$M = \frac{\mu_0 \mu_r N_1 N_2 \pi r_2^2}{2 \mu_1}$$



Ques = 14

Len's Maker's Formula :-

We know that, for Rarer to Denser, Refraction formula is :-

$$\frac{\mu_2}{V} - \frac{\mu_1}{u} = \frac{\mu_2 - \mu_1}{R}$$

for denser to rarer,

$$\frac{\mu_1}{V} - \frac{\mu_2}{u} = \frac{\mu_1 - \mu_2}{R}$$

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For first side of lens, P is object and P' is image

$$\frac{\mu_2}{v'} - \frac{\mu_1}{u} = \frac{\mu_2 - \mu_1}{R_1} \quad \text{——— (i.)}$$

For second side of lens, P is object and Q is image.

$$\frac{\mu_1}{v} - \frac{\mu_2}{v'} = \frac{\mu_1 - \mu_2}{R_2} \quad \text{——— (ii.)}$$

Adding both equations :-

$$\frac{\mu_1}{v} - \frac{\mu_1}{u} = \mu_2 - \mu_1 \left[\frac{1}{R_1} - \frac{1}{R_2} \right]$$

$$\mu_1 \left[\frac{1}{v} - \frac{1}{u} \right] = \mu_2 - \mu_1 \left[\frac{1}{R_1} - \frac{1}{R_2} \right]$$

From Lens Formula ⇒

$$\mu_1 \times \frac{1}{f} = \mu_2 - \mu_1 \left[\frac{1}{R_1} - \frac{1}{R_2} \right]$$

$$\frac{1}{f} = \frac{\mu_2 - \mu_1}{\mu_1} \left[\frac{1}{R_1} - \frac{1}{R_2} \right]$$

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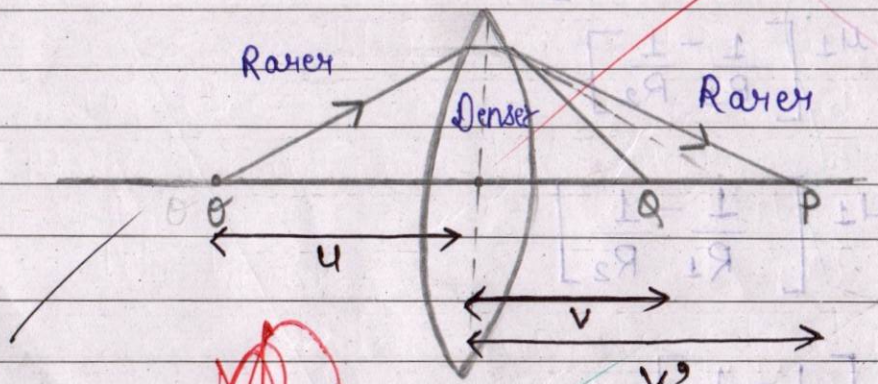
$$\frac{1}{f} = \frac{\mu_2}{\mu_1} - \frac{\mu_1}{\mu_1}\left[\frac{1}{R_1} - \frac{1}{R_2}\right]$$

$$\boxed{\frac{1}{f} = (\mu_r - 1)\left[\frac{1}{R_1} - \frac{1}{R_2}\right]} \Rightarrow \text{This is required expression}$$

where, f = focal length of convex lens
R_1 and R_2 = radius of curvature of lens.
μ_r = refractive index of medium.



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From Bohr's model, we know that,

$$V = \frac{1}{137} \frac{c}{n}$$

where,
V = speed of electron
c = speed of light = 3×10^8 m/s
n = levels no.

So, for n = 1

$$V = \frac{1 \times 3 \times 10^8}{137 \times 1}$$

$$V = \frac{3 \times 10^8}{137} \text{ m/s}$$

~~$V \Rightarrow 0$.~~

For n = 2

$$V = \frac{1 \times 3 \times 10^8}{137 \times 2}$$

$$V \Rightarrow \frac{3 \times 10^8}{274} \text{ m/s}$$

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$$\frac{}{137 \times 3}$$

$$V = \frac{10^8}{137} \text{ m/s.}$$

~~$v \Rightarrow$~~ ~~10~~

As we know, $V \propto \frac{1}{n}$ so, value of v decreases as we increase value of 'n'.

Ques=16

Coulomb inverse square law states that :- The electrostatic force b/w two charges is directly proportional to the product of charges and inversely proportional to the square of distance between them.

We know,

electric flux due to element

$d\phi = E \cdot dA.$

$= E dA \cos\theta$

$= E dA \cos 0^\circ$

$d\phi \Rightarrow E dA$

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$$\phi = \int E \, dA$$

$$\phi = E \int dA$$

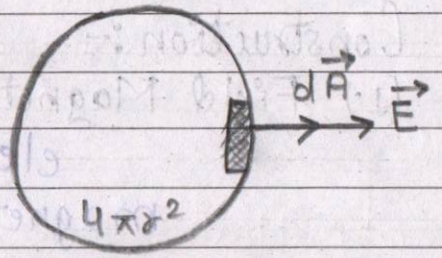
$$\phi = E \times 4\pi r^2 \quad \text{——(i.)}$$

A/c to Gauss theorem

$$\phi = \frac{Q}{\epsilon_0} \quad \text{——(ii.)}$$

from both equations,

$$\frac{Q}{\epsilon_0} = E \times 4\pi r^2$$



$$\boxed{\frac{Q}{4\pi\epsilon_0 r^2} = E} \quad \text{——(iii.)}$$

Now we know that,

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

$$\frac{Q}{4\pi\epsilon_0 r^2} = \frac{F}{q_0}$$

$$\boxed{\frac{Qq_0}{4\pi\epsilon_0 r^2} = F}$$ → This is required expression.

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A.C. generator or A.C. dyanmo is a device used to convert mechanical energy into electrical energy.

It works on the principle of electromagnetic induction.

B
S
E

Construction :-

(1.) Field Magnets :- Two strong pole magnets of electromagnet are used to create magnetic field.

(2.) Armature (ABCD) :- Rectangular shaped armature with number of turns ~~or~~ with soft iron core is rotated in the magnetic field.

(3.) Slid Rings (C_1 & C_2) :- Metal rings attached with both two ends of armature,

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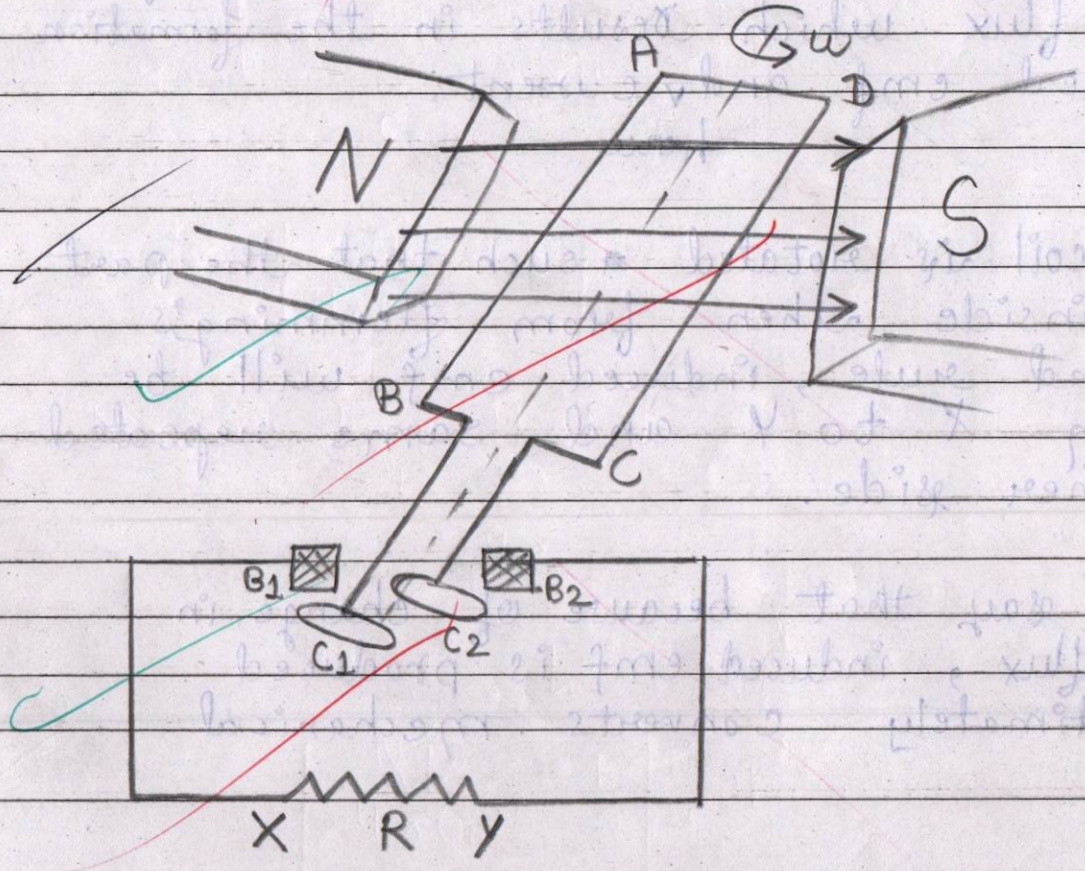
these rings also rotate with rotation of armature.

(4.) Brushes (B_1 & B_2) :— flexible, fixed metal plates. The function of brushes is to transfer induced current from armature to the external resistance.



A.C. Generator. Diagram.

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A.C. generator works on the principle of electromagnetic induction.
It follows that whenever there is a change in magnetic flux, an induced emf is produced.

Because of rotation of armature in magnetic field produced by magnets, there is a change in magnetic flux which results in the formation of induced emf and current.
hence

Firstly when coil is rotated such that the part CD goes inside then from flemming's right hand rule, induced emf will be flow from X to Y and same repeated with other side.

Hence, we can say that because of change in magnetic flux, induced emf is produced which ultimately converts mechanical

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energy in the form of induced current.

Ques = 18

Interference	Diffraction
(1.) The phenomenon of superimposition of two waves of equal frequency, almost equal amplitude, moving in same direction with zero or constant phase difference at many points where intensity becomes maximum and minimum.	(1.) The phenomenon of bending of light when obstacle comes in path of light wave, around the corners of obstacle.
(2.) Interference occurs when two light waves superimpose from coherent sources.	(2.) Light waves from different sources can also cause diffraction

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(3.) Width of the interference fringes are equal.	... maximum and decreases as we move away from centre.
(4.) Minimum intensity fringe is zero, so it is easy to distinguish between them.	(4.) Minimum intensity fringe is not perfectly darkened so it is relatively difficult to distinguish between bright and dark fringes.
(5.) Two types of interference are :- Constructive and destructive interference	(5.) Types of diffraction are :- Fraunhofer and Fresnel diffraction.

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P-N Junction diode is formed when P-type semiconductor is joined with N-type semiconductor by some special techniques such as etching or sandwiching.

It is a type of non-ohmic resistor.

B S E

Rectifier :- It is a device used to convert AC into DC, and the process is called rectification.

For Full-Wave rectification :-
Complete cycle of AC converts into DC.

For half positive cycle, A is at positive terminal and B is at negative terminal with respect to E. At this, D_1 behaves as forward-bias and allows the current to flow through it and current flows from external resistance from C to D.

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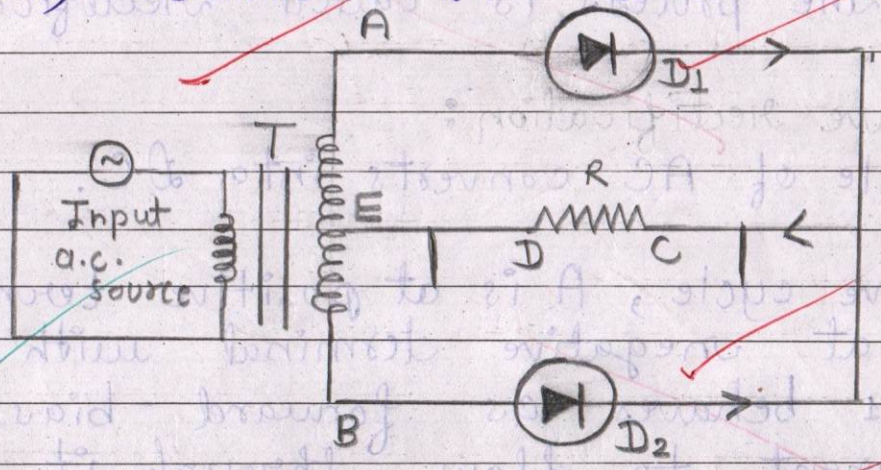
For next half cycle, B is at positive terminal and A is at negative with respect to E. In this, D_2 is in forward bias and D_1 is in backward bias. Hence D_2 allows the current to flow through it from C to D.

In this way, complete cycle (positive and negative) converts into DC.



T ⇒ step-up transformer
D_1 and D_2 ⇒ P-N junction diodes.
R ⇒ Output source
A and B ⇒ Terminals.

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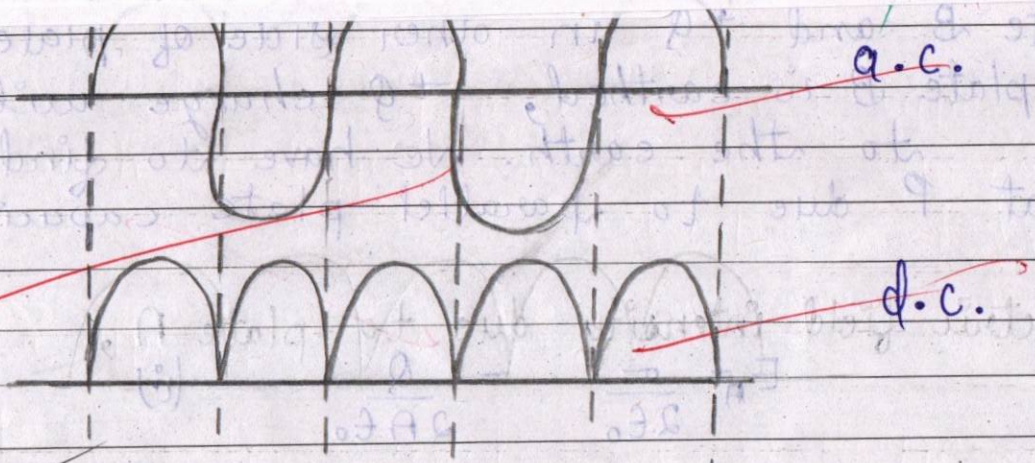

Ques = 20

diagram, a construction of parallel-plate capacitor is taken. Two plates A and B are at distance 'd' from each other. 'A' is the area of plates. Surface density of plate A is $+\sigma$ and plate B is $-\sigma$.

$+Q$ charge is given to plate A due to which $-Q$ charge is induced in the nearer surface of

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plate B and 'y' in other side of plate B.
As plate B is earthed, +Q charge will go to the earth. We have to find capasity at P due to parallel plate capacitor.

Now,

Electric field intensity due to plate A,

$$E_A = \frac{\sigma}{2\epsilon_0} = \frac{Q}{2A\epsilon_0} \quad \text{—(i)} \qquad \left\{\sigma = \frac{Q}{A}\right\}$$

Electric field intensity due to plate B,

$$E_B = \frac{\sigma}{2\epsilon_0} = \frac{Q}{2A\epsilon_0} \quad \text{—(ii)}$$

Resultant intensity :—

$$E = \frac{Q}{2A\epsilon_0} + \frac{Q}{2A\epsilon_0} \qquad \text{from (i) \& (ii)}$$

$$E = \frac{Q}{A\epsilon_0} \quad \text{—(iii)}$$

Now, Potential difference (V) $= E \times d$

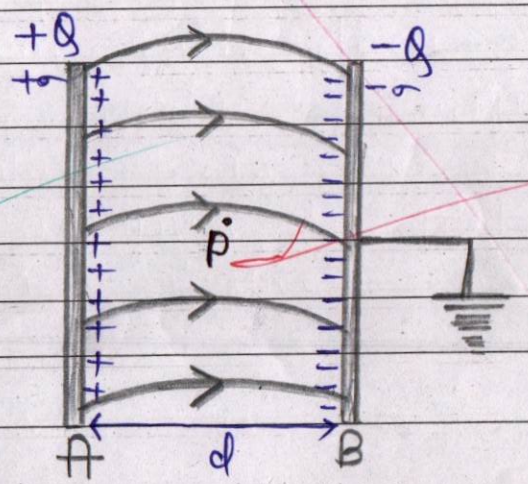
$= \frac{\sigma}{A\epsilon_0} \times d$ — (iv.) from (iii.)

We know, Capacity $= \frac{Q}{V}$

$\Rightarrow \frac{Q}{\frac{\sigma}{A\epsilon_0} d}$ from eq (iv.)

$$C = \frac{A\epsilon_0}{d}$$

$\Rightarrow$ This is required expression



∴Figure

P.T.O.

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(1.) Distance between two parallel plates.
On increasing distance, capacity decreases.

(2.) Area of plates.
On increasing area, capacity increases.