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	प्राप्तांक (अंकों में)	प्रश्न क्रमांक	पृष्ठ क्रमांक	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			कुल प्राप्तांक		
16					

परीक्षक एवं उपमुख्य परीक्षक द्वारा भरा जावे ↓

परीक्षक एवं उपमुख्य परीक्षक द्वारा भरा जावे →

प्रमाणित किया जाता है कि अन्दर के पृष्ठों के अनुरूप मुख्य पृष्ठ पर अंकों की प्रविष्टी एवं अंकों का योग सही है।
निर्धारित मुद्राः 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
3525470	3528464

प्रश्न क्र.

B S E

Question no. 1

Answer (a) 6.25×10^{18}

Answer (b) tangent

Answer (c) transverse, non-mech

Answer (d) Polarisation interfere

Answer (5) 90°

Answer (6) short

Question no. 2

Answer (a) (i) Electrons

Answer (b) (iii) one

Answer (c) (iii) magnetic and ele field

Answer (d) Law of conservation of rge

Answer (e) (a) Photoelectric effect

Answer (f) (10) Henrich Hertz

प्रश्न क्र.

Question no. 3

Answer no. (i) $Q = ne$

Answer no. (ii) (a) $10^{15} Hz - 10^{16} Hz$

Answer no. (iii) $P = 1/f = 1/0.5 = +2 D$

Answer no. (iv) Henry = weber/A

Answer no. (v) $I_0/\sqrt{2}$

Question no. 4

(a) Intensity of light – (iii) Number of photon

(b) frequency of light – (iii) frequency of photon

(c) work function – (i) minimum energy to emit electron surface

(d) Matter wave – (v) moving particle

(e) Threshold frequency – (ii) minimum frequency to emit electron surface

(f) Particle nature of light – (vi) photon photon

BSE

प्रश्न क्र.

Question no. 5

Answer (a) ~~False~~ True

Answer (b) True

Answer (c) false

Answer (d) True

Answer (e) True

B S E

Answer no. 6

According to Malus law, If a polarised light of intensity I_0 is incident on a polaroid (i.e passes through it) and θ is angle between the plane of vibration of electric field and planes of polarisation then intensity of transmitted light is

$$I = I_0 \cos^2\theta$$

यो. पूर्ण पृष्ठ … पृष्ठ 5 के अंक … कुल अंक

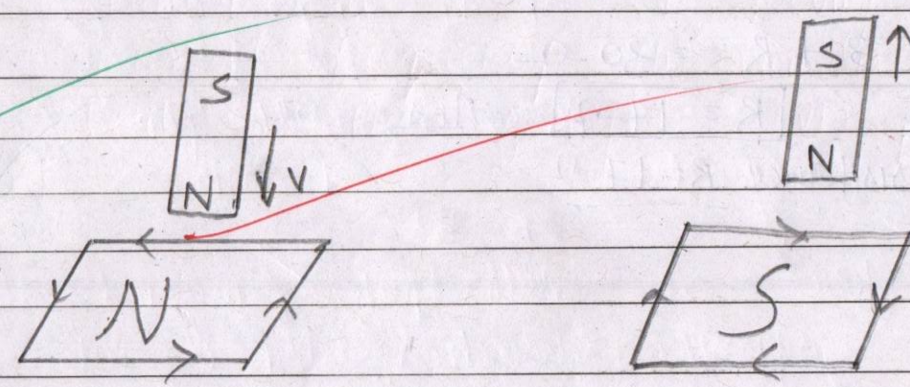
प्रश्न क्र.

Answer no. 7

The A.C supplied to our house is 220v, which is rms value of A.C, the peak voltage of A.C. source is $220\sqrt{2}$ v 310.20 v hence A.C is more powerful than direct current at same voltage.

Answer no. 8

According, to Lenz law, when magnetic line of force associated with a conducting coil is changed e.m.f. is induced in the coil, the direction of induced current is such that it opposes the cause due to which it is produced.



प्रश्न क्र.

Answer no. 9

Given,

Emf of battery $E = 10V$

Internal resistance $r = 3\Omega$

current I in the circuit is $= 0.5A$

Let, Resistance of resistor $= R$

$$I = \frac{E}{r+R}$$

$$r+R = \frac{E}{I} = \frac{10}{0.5} = 20\Omega$$

$$3 + R = 20\Omega$$

$$\boxed{R = 17\Omega} \quad \text{Ans}$$

Hence, resistance $R = 17\Omega$

Answer no. 10 (11)

Two difference between intrinsic and extrinsic semiconductor.

Intrinsic Semiconductor	Extrinsic semiconductor
(i) Pure semiconductor is known as intrinsic semiconductor	Impure semiconductor made by doping is known as extrinsic semiconductor.
(ii) In intrinsic semiconductor hole pair density is ~~great~~ equal to electron pair density ($n_h = n_e$)	In N type semiconductor number of Electron pair is greater than number of hole pair ($n_e \gg n_h$) and in p-type number of hole is greater than electron pair ($n_h \gg n_e$)

Answer no. 10

Potential of each point of a hollow conductor is equal because inside a hollow conductor electric field is zero, hence no workdone is required to move an electron inside hollow conductor. it's potential is equal to surface potential.

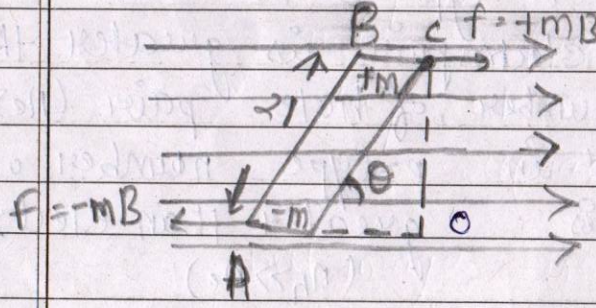
प्रश्न क्र.

कुल अंक

Answer no. 12

Ionization energy :- The energy required to remove an electron from the outermost orbit of an atom to infinity is known as ionization energy.

Answer no. 13



Let a magnet AB be placed in a uniform magnetic field of field strength $\vec{B}$ at an angle θ.

force on north pole of magnet towards direction of magnet $\vec{f} = m\vec{B}$

force on south pole of magnet towards opposite direction $\vec{f} = -m\vec{B}$

Magnetic moment of magnet $\vec{M} = m \times 2l$

since two forces are equal and opposite, their net effect is cancelled.

But a torque acts on magnet to rotate it and bring it plane ~~perpendicular to~~ parallel to magnetic field.

torque τ on magnet τ = one force × perpendicular distance

$$\tau = m\vec{B} \times OC \quad \text{—(I)}$$

or, know than

$$\sin\theta = \frac{\text{Perpendicular}}{\text{hypotenuse}} = \frac{OC}{AB}$$

$$\sin\theta = \frac{OC}{2l}$$

$$OC = 2l\sin\theta \quad \text{—(II)}$$

putting value in eq (I)

$$\tau = m\vec{B} \times 2l\sin\theta$$

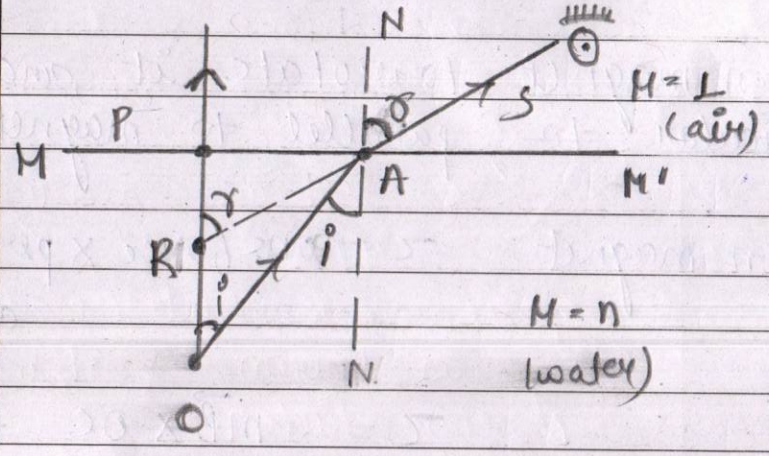
$$\tau = m \times 2l\, \vec{B}\sin\theta$$

$$\tau = \vec{M}\vec{B}\sin\theta \quad (\because \vec{M} =$$

In vector for $\boxed{\tau = \vec{M} \times \vec{B}}$ Ans

प्रश्न क्र.

Answer no. 14



Let, MM' be the boundary between two medium an observer from air tries to look at an object O at depth of PO (h) which is real depth. in water of refractive index μ

A ray from object O is incident at interface at point O and refract to follow path OS another perpendicular ray OP is incident on point P and goes without refraction, the two rays do not meet

But image is formed at a depth PK when ray is produced backward which is its apparent height h'

$PR = h'$

$PO = h$

∵ angle of incidence $\angle OAN = i$

angle of refraction $\angle OAS = r$

प्रश्न क्र.

$\because$ OP || AN

$\angle POA = \angle O'AN = i$

$\angle PRA = \angle NAS = \gamma$

In ΔPOA

$\sin i = \frac{PA}{OA}$

In ΔPRA $\sin \gamma = \frac{PA}{AR}$

now applying snells law

$$\omega \mu_a = \frac{\sin i}{\sin \gamma} = \frac{PA/OA}{PA/AR}$$

$$\omega \mu_a = \frac{AR}{OA}$$

we know that

$$\omega \mu_a = \frac{1}{a \mu_\omega}$$

$$a \mu_\omega = \frac{OA}{AR}$$

$\because$ A and P are close to each other

from eq ① and ⑪

$$a \mu_\omega = \frac{OP}{RP}$$

$OA = OP$ — ①

$OR = RP$ — ⑪

$$a \mu_\omega = \frac{\text{Real depth}}{\text{Apparent depth}} = \frac{h}{h'}$$

कुल अंक

प्रश्न क्र.

$$a\mu_w = \frac{h}{h'}$$

Ans

shift in position of image

$$OR = OP - PR$$
$$= h - h'$$
$$OR = h - \frac{h}{a\mu_w} \quad [\because$$

$$\boxed{OR = h\left(1 - \frac{1}{a\mu_w}\right)}$$

प्रश्न क्र.

Answer no. 15

According to Bohr's theory electron revolve around the nucleus in fixed orbits in circular path. Hence, required centripetal acceleration is provided to it by electrostatic force between nucleus and electron.

Electrostatic force b/w electron and nucleus

$$f_e = \frac{1}{4\pi\epsilon_0} \frac{eZe}{r^2}$$

Centripetal force

$$f_c = \frac{mv^2}{r}$$

$$f_c = f_e$$

$$\frac{1}{4\pi\epsilon_0} \frac{Ze^2}{r^2} = \frac{mv^2}{r}$$

$\because Z = 1$

$$\frac{1}{4\pi\epsilon_0} \frac{e^2}{r} = mv^2$$

$$v^2 = \frac{1}{4\pi\epsilon_0} \frac{e^2}{rm}$$

$$v = \sqrt{\frac{e^2}{4\pi\epsilon_0 rm}}$$

$$v = \sqrt{\frac{(1.6\times10^{-19})^2}{8.85\times10^{-12}\times}}$$

B S E

प्रश्न क्र.

B
S
E

$$V = \sqrt{\frac{(1.6 \times 10^{-19})^2}{8.85 \times 10^{-12} \times 0.59 \times 10^{-10} \times \frac{n^2}{1} \times 9.1 \times 10^{-31}}}$$

$$V = 2.18 \times 106 \times \frac{1}{n} \ m/s$$

∴ Velocity of first orbit n = 1

$$\boxed{V = 2.18 \times 106 \ m/s}$$

Velocity of second orbit n = 2

$$\boxed{V = \frac{2.18 \times 106}{2} = 1.09 \times 106 \ m/s}$$

Velocity of third orbit n = 3

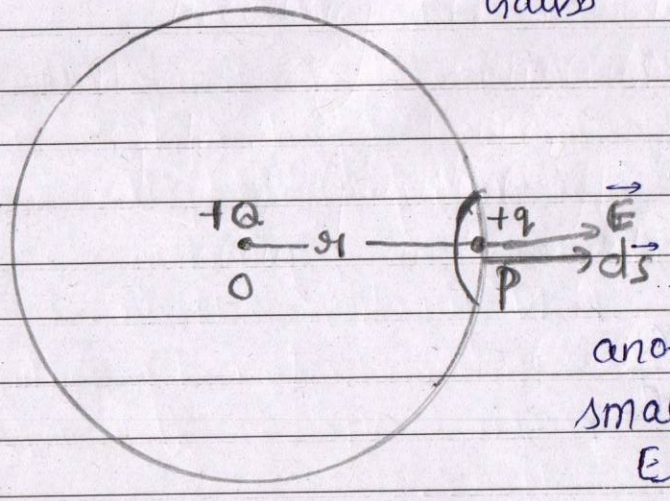
$$\boxed{V = \frac{2.18 \times 10^6}{3} = 0.726 \times 10^6 \ m/s}$$

प्रश्न क्र.

Answer no. 16

We have to prove coulombs law with the help of Gauss theorem.

Let a point charge $+Q$ be kept at a point O. taking O as centre and radius r draw a sphere.



At point p of sphere consider another point charge $+q$ and a small area $d\vec{s}$ is towards Electric field vector $\vec{E}$

Electric field at point $P = \vec{E}$

We know that ~~magnetic~~ flux passing through a cross section area $\phi_E = \oint \vec{E} \cdot d\vec{s} = |\vec{E}||d\vec{s}| \cos\theta$

$\theta = 0°$ since ~~direction~~ $\vec{E}$ and $d\vec{s}$ is same

$$\phi_E = \oint \vec{E} d\vec{s} \quad \text{—(i)}$$

But according to Gauss theorem

$$\phi_E = \frac{q_{in}}{\varepsilon_0} = \frac{Q}{\varepsilon_0} \quad \text{—(ii)}$$

ε_0 = permittivity of air)

from eq ① and ⑪

$$\oint \vec{E} \cdot \vec{ds} = \frac{Q}{\epsilon_0}$$

$$\vec{E} \oint \vec{ds} = \frac{Q}{\epsilon_0}$$

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

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

force on charge $+q$ $= f = qE$

$$\boxed{f = \frac{Qq}{r^2} \frac{1}{4\pi\epsilon_0}}$$

प्रश्न क्र.

Answer no. 18

four difference between interference and diffraction.

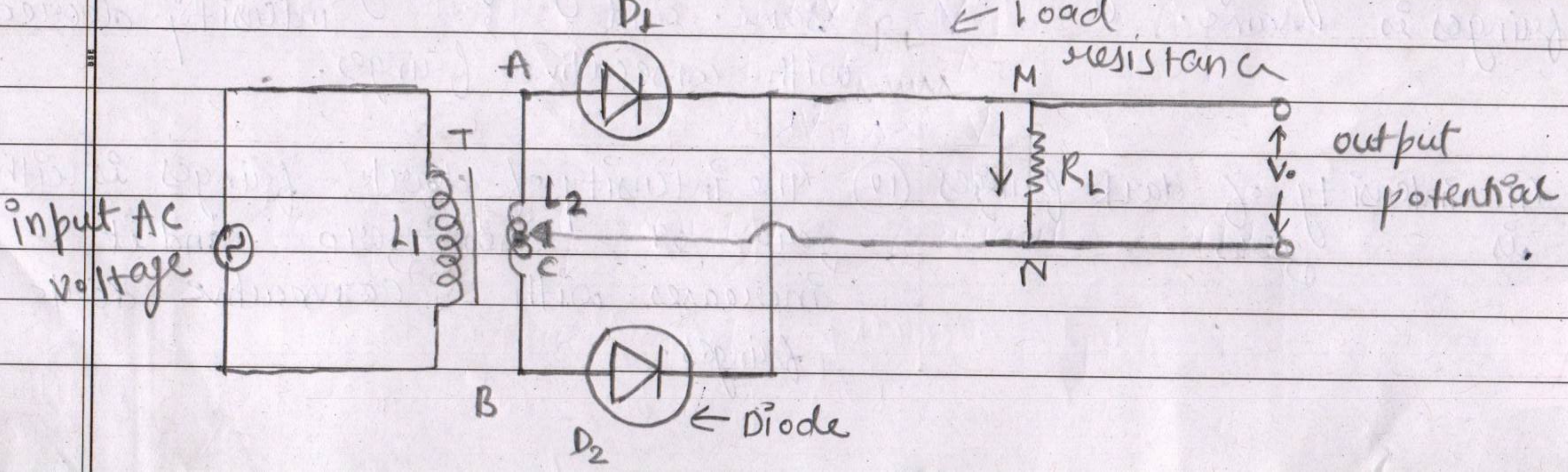
Interference	Diffraction
(i) The superposition of two waves from coherent sources is called interference	(i) The phenomenon of superposition of two secondary wavelet from two points of same (source wavefront) is known as diffraction.
(ii) The interference fringes are equidistant (i.e fringe width same)	(ii) The diffraction fringes are not equidistant
(iii) The intensity of bright fringes is same.	(iii) The intensity of bright fringes is not same. and intensity decreases with consecutive fringes.
(iv) The intensity of dark fringes is zero	(iv) The intensity of dark fringes is either zero or non-zero and it increases with consecutive dark fringes.

प्रश्न क्र.

Answer no. 19

PN Junction diode :- ~~If we~~ If half of the crystal of a pure semiconductor is doped with pentavalent impurity and the remaining half with trivalent impurity like (B, Al, In), a junction is formed. This is called a P-N junction diode.
Or if we join N-type and P-type semiconductor by melting their surface in a specific device it is known as a P-N junction diode.

PN Junction diode as a ~~re.~~ full wave rectifier

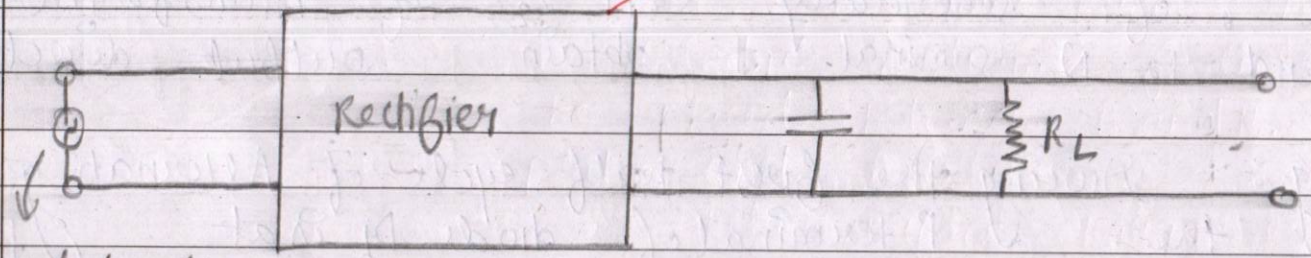


प्रश्न क्र.

figure shows full wave rectification of junction diode. for full wave rectification two diode D_1 and D_2 are used. The input alternating potential is applied across the terminals of primary coil L_1 of transformer T. The ends A and B of secondary coil L_2 is connected to P terminal of both diode and its N terminal connected to each other. The load resistance R_L is connected to point C in centre of secondary coil L_2 of transformer. and other end to N terminal to obtain output direct potential.

Working :- During the first half cycle of Alternating potential the P terminal of diode D_1 is at positive potential and the P- terminal of D_2 is at negative potential i.e. D_1 is forward biased and D_2 is in reverse biase, hence current flows through D_1 but no current flows through D_2. In the remaining half cycle the P-terminal of diode D_1 is at negative potential and p-terminal of diode D_2 is at positive potential. Hence current flows through D_2 but no current flows through D_1. Thus it is clear that a unidirectional potential is obtained across load resistance R_L for complete cycle of input potential. It is clear

from following diagram current flows in load resistance R_L in direction M to N only (but current is still time varying). Thus unidirectional A.C. is obtained. It can be converted to D.C. by using filter circuit. for this across output terminal of high capacity must be connected and output is obtained across load resistance.



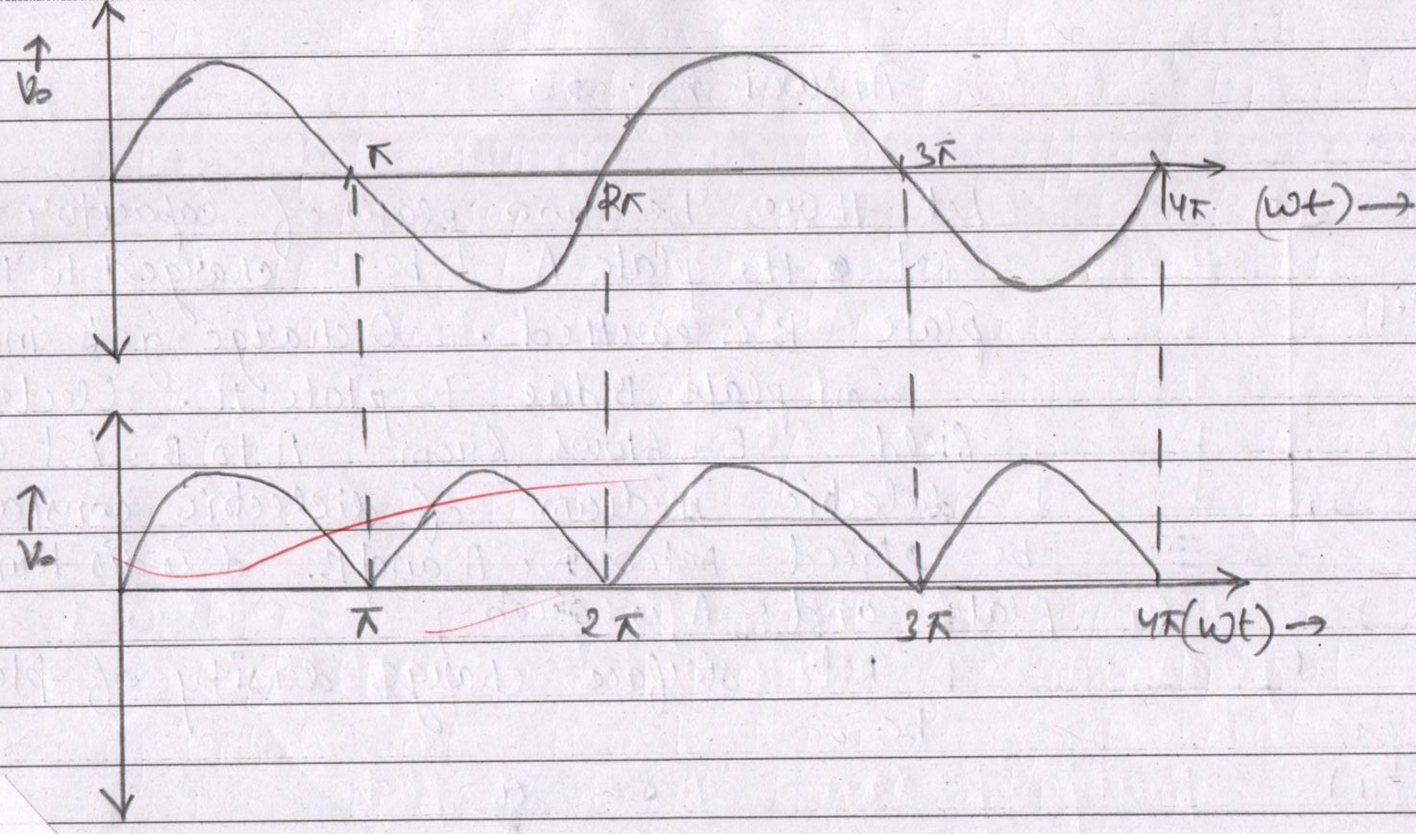
If V_0 is peak voltage of input A.C.

$$V_{av} = \frac{2V_0}{\pi}$$

$$V_{rms} = \frac{V_0}{\sqrt{2}}$$

Total resistance of circuit = $r + R_L$

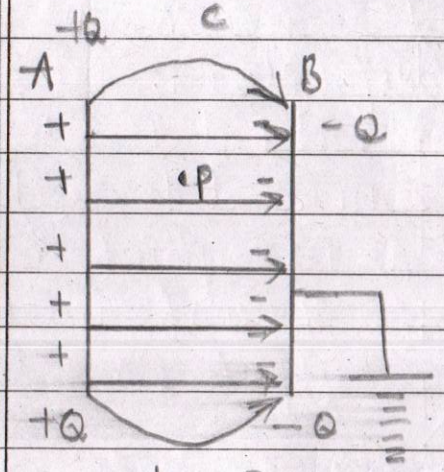
प्रश्न क्र.



प्रश्न क्र.

B S E

Answer no. 20



Let there be two plates of capacitor A and B let @ the plate A be charged to +Q and plate B is earthed. -Q charge get induced on plate B due to plate A. Electric field E flows from A to B. Let a dielectric medium of dielectric constant k be placed between A and B. d is distance b/w plate and A is area

Let surface charge density of plate be σ

$$\sigma = \frac{Q}{A}$$

Electric field $\vec{E_1}$ due to plate A is parallel normal to plate and is directed towards B.

$$\vec{E_1} = \frac{\sigma}{2k\epsilon_0} \quad -(1)$$

(ϵ_0 = permittivity of air)

Electric field $\vec{E_2}$ due to plate B is towards B.

$$\vec{E_2} = \frac{\sigma}{2k\epsilon_0} \quad -(11)$$

प्रश्न क्र.

net electric field $\vec{E}$ at point P due to two plates

$$\vec{E} = \vec{E_1} + \vec{E_2}$$

$$E = \frac{\sigma}{2K\epsilon_0} + \frac{\sigma}{2K\epsilon_0}$$

$$\vec{E} = \frac{\sigma}{K\epsilon_0}$$

Let the potential difference between two plates of condenser be V. and charge is Q.

$$V = E \times d$$

$$V = \frac{\sigma}{K\epsilon_0} \times d = \frac{Q}{AK\epsilon_0} d$$

~~We know that charge Q is directly proportional to Capacity~~

We know that potential V is directly proportional to charge Q

$$V \propto Q$$

$$\boxed{CV = Q}$$ where C is a constant called capacity of plate.

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

$$C = \frac{Q}{\frac{Q\,d}{A\varepsilon_0 K}}$$

$$\boxed{C = \frac{\varepsilon_0 A K}{d}}$$

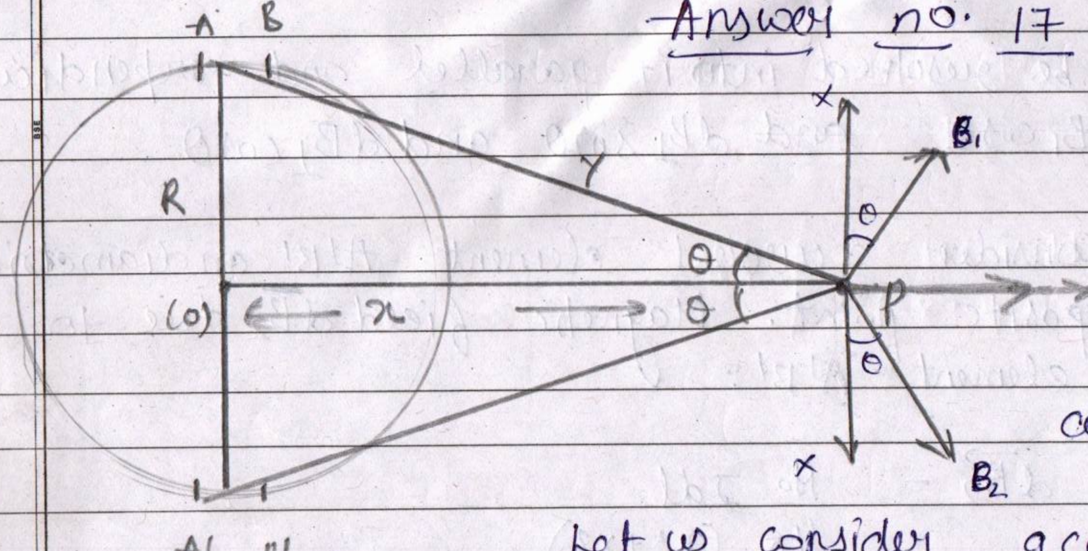
(i) Hence, capacity of parallel plate condenser depends on distance between plate

(ii) Capacity depends on Area of plate

(iii) Capacity depends on dielectric medium between the plate.

प्रश्न क्र.

Answer no. 17



Let us consider a current carrying coil carrying a current I having radius = r. We are to find magnetic field due to this coil at a point P on axis of coil.

Let us consider a current element AB on coil. magnetic field $d\vec{B_1}$ due to this current carrying coil Length of current element dl and y is distance of line joining θ = 90°. According to Biot Savart law.

In △AOP, PGT

$Y^2 = R^2 + X^2$

$Y = \sqrt{R^2 + X^2}$

$d\vec{B_1} = \frac{\mu_0}{4\pi} \frac{Idl}{Y^2} \sin\theta = \frac{\mu_0}{4\pi} \frac{Idl}{Y^2} \sin 90°$

$d\vec{B_1} = \frac{\mu_0}{4\pi} \frac{Idl}{Y^2}$ — ①

$d\vec{B_1} = \frac{\mu_0}{4\pi} \frac{Idl}{(r^2 + X^2)}$

प्रश्न क्र.

B
S
E

This dB_1 can be resolved into it parallel and perpendicular component as ~~$B_1\cos\theta$~~ ~~and~~ $dB_1\sin\theta$ and $dB_1\cos\theta$

similarly consider a current element A'B' on diametrically opposite point. Magnetic field $d\vec{B_2}$ due to current element A'B'.

$$d\vec{B_2} = \frac{\mu_0}{4\pi}\frac{Idl}{(r^2+x^2)}$$

It can also be resolved in its perpendicular and parallel component as $B_2\cos\theta$ and $B_2\sin\theta$.

since ∵ B_1 and B_2 are equal in magnitude and their perpendicular component are opposite they cancel each other.

$$d\vec{B} = B_{net} = dB_1\sin\theta + dB_2\sin\theta \qquad \because B_1 = B_2$$

$$d\vec{B} = 2B_1\sin\theta$$

$$d\vec{B} = 2 \times \frac{\mu_0}{4\pi} \frac{I dl}{(R^2+x^2)} \sin\theta$$

In right triangle ΔAOP,

$$\sin\theta = \frac{P}{H} = \frac{R}{\sqrt{R^2+x^2}}$$

$$d\vec{B} = 2 \times \frac{\mu_0}{4\pi} \frac{I dl}{(R^2+x^2)} \times \frac{R}{\sqrt{R^2+x^2}}$$

$$d\vec{B} = 2 \times \frac{\mu_0}{4\pi} \frac{I dl\, R}{(R^2+x^2)^{3/2}}$$

Magnetic field due to complete ring $\vec{B}$

$$\vec{B} = \int_0^{2\pi r} d\vec{B} = \int_0^{2\pi r} 2 \times \frac{\mu_0}{4\pi} \frac{I dl \times R}{(R^2+x^2)^{3/2}}$$

$$\vec{B} = 2 \frac{\mu_0}{4\pi} \frac{I R}{(R^2+x^2)^{3/2}} \int_0^{2\pi r} dl$$

$$\vec{B} = 2 \times \frac{\mu_0}{4\pi} \frac{I R}{(R^2+x^2)^{3/2}} \times \pi R$$

प्रश्न क्र.

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

$$\boxed{\vec{B} = \frac{\mu_0 I R^2}{2(R^2+x^2)^{3/2}}} \quad \text{Ans}$$