# ST. ANTHONY'S PU COLLEGE

OPP TO RV COLLEGE, RV POST, MYSORE ROAD, BANGALORE – 560059

## II PUC MODEL PAPER –2

## PHYSICS (33)

**TOTAL NUMBER OF QUESTIONS: 48**

**DURATION: 3Hrs 15 Min** **MAX·MARKS: 70**

**General Instructions:**

a) All parts are compulsory.
b) Part – A questions have to be answered in the first two pages of the answer-booklet. For Part – A questions, first written-answer will be considered for awarding marks.
c) Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.
d) Direct answers to the numerical problems without detailed solutions will not carry any marks.

## PART – A

**I. Pick the correct option among the four given options for all of the following questions**

**$15 \times 1 = 15$**

**1.** The torque acting on a dipole of moment $\vec{P}$ in an electric field $\vec{E}$ is

a] $\vec{P} \cdot \vec{E}$ b] $\vec{P} \times \vec{E}$ c] Zero d] $\vec{E} \times \vec{P}$

**Ans:** b] $\vec{P} \times \vec{E}$

**2.** The effective capacitance is more than the smallest of the individual capacitances in

a] Mixed group b] Series combination

c] Parallel combination d] None of these

**Ans:** c] Parallel combination

**3.** The alloys constantan and manganin are used to make standard resistance due to they have

a] Low resistivity b] High conductivity

c] Low temperature coefficient of resistance d]Both (b) and (c)

**Ans:** c] Low temperature coefficient of resistance

**4.** Which of the following is correct

a]Ammeter has low resistance and is connected in series

b]Ammeter has low resistance and is connected in parallel

c]Voltmeter has low resistance and is connected in parallel

d]None of the above

**Ans:** a]Ammeter has low resistance and is connected in series

**5.** Identify Magnets cannot be made from which of the following substances

a] Iron b] Nickel c]Copper d]All of these

**Ans:** c] Copper

**6.** The self-inductance of a straight conductor is

a ]Zero b]Very large c]Infinity d]Very small

**Ans:** a ]Zero

**7.** In an ac circuit, a resistance of R ohm is connected in series with an inductance L. If phase angle between voltage and current be 45°, the value of inductive reactance will be

(a) $\frac{R}{4}$ (b) $\frac{R}{2}$

(c)R (d) Cannot be found with the given data

**Ans:** (c)$\tan\varphi = \frac{X_L}{R} \Rightarrow \tan 45^o = \frac{X_L}{R} = 1 \Rightarrow X_L = R$

**8.** The resonant frequency of a circuit is f. If the capacitance is made 4 times the initial values, then the resonant frequency will become

(a) f / 2 (b) 2f (c) f (d) f / 4

**Ans:** (a) $f = \frac{1}{2\pi\sqrt{LC}} \Rightarrow f \propto \frac{1}{\sqrt{C}}$

**9.** Match List –I (Electromagnetic wave type) with List – II (Its association/application) and select the correct option from the choices given below the lists:

| List - I | | List -II | |
|---|---|---|---|
| (a) | Infrared waves | (i) | To treat muscular strain |
| (b) | Radio waves | (ii) | For broadcasting |
| (c) | X – rays | (iii) | To detect fracture of bones |
| (d) | Ultraviolet rays | (iv) | Absorbed by the ozone layer of the atmosphere |

a] (i) (ii) (iii) (iv)

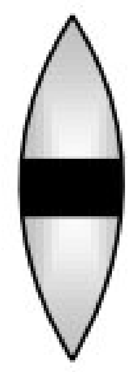
b] (iv) (iii) (ii) (i)

c] (i) (ii) (iv) (iii)

d] (iii) (ii) (i) (iv)

**Ans:** a]

**10.** If the central portion of a convex lens is wrapped in black paper as shown in the figure



a)No image will be formed by the remaining portion of the lens

b)The full image will be formed but it will be less bright

c)The central portion of the image will be missing

d)There will be two images each produced by one of the exposed portions of the lens

**Ans:** b)The full image will be formed but it will be less bright

**11.** Evidence for the wave nature of light cannot be obtained from

(a)Reflection (b) Doppler effect (c)Interference (d)Diffraction

**Ans:** (a) Reflection phenomenon is shown by both particle and wave nature of light.

**12.** The graph of stopping potential against frequency of the incident radiation is

a) Sinusoidal b) Exponential c) Linear d) Parabolic

**Ans:** c) Linear

**13.** The Rutherford $\alpha$-particle experiment shows that most of the $\alpha$-particles pass through almost unscattered while some are scattered through large angles. What information does it give about the structure of the atom

a) Atom is hollow

b) The whole mass of the atom is concentrated in a small centre called nucleus

c) Nucleus is positively charged

d) All the above

**Ans:** d)All the above

**14.** In a nuclear reaction, which of the following is conserved

a) Atomic number b)Mass number

c) Atomic number, mass number and energy d)None of these

**Ans:** (c)

**15.** The impurity atom added to germanium to make it N-type semiconductor is

a) Arsenic b)Iridium c) Aluminium d)Iodin

**Ans:** (a) For N-type semiconductor, the impurity should be pentavalent.

**II. Fill in the blanks by choosing appropriate answer given in the brackets for ALL the following questions** **5 × 1 = 5**

**(Zero, Maximum, Intensity, Non- linear, Hydrogen)**

**16.** The magnetic field at the centre of circular loop is……………..

**Ans: Maximum**

**17.** The inductive reactance in dc circuit is………………

**Ans: Zero**

**18.** …………of a wave is directly proportional to square of amplitude of the wave.

**Ans: Intensity**

**19.** ……………………….....was considered to be building block of all matter

**Ans: Hydrogen**

**20.** Before cut in voltage, the I-V curve is…………………. ....

**Ans: Non- linear**

## PART – B

**III. Answer any five of the following questions** **5 × 2 = 10**

**21. What is electric flux? Mention the SI unit of electric flux**

**Ans:** Electric flux over a given surface is the number of electric lines of force passing normally through a given surface.

- SI unit of electric flux is $Nm^2C^{-1}$

**22. Write any two properties of equipotential surface**

**Ans:** Properties of equipotential surface

1) The direction electric field is always normal to the equipotential surfaces.
2) Two equipotential surfaces cannot intersect.

**23. A galvanometer of resistance 50 Ω requires a current of $2 \times 10^{-3}$A for full scale deflection. How do you convert it into an ammeter of range 0 − 3A?**

**Ans:** Shunt, $S = \frac{I_g G}{I - I_g} = \frac{2\times10^{-3}\times50}{3-2\times10^{-3}} = 33.35 \times 10^{-3}\ \Omega$

A resistance of $33.35 \times 10^{-3}\ \Omega$ must be connected in parallel with galvanometer

**24. What is magnetic susceptibility? For which material is it low and positive?**

**Ans:** Magnetic susceptibility is defined as the ratio of magnetization and the magnetic intensity.

- Paramagnetic materials possess low and positive susceptibility

**25. Mention an expression for self-inductance of a solenoid and explain the terms.**

**Ans:** Self-induction, $L = \mu_o n^2 A l$

Where $\mu_o$ is permeability of free space

n is number of turns per unit length in the solenoid

$l$ is length of solenoid.

A is area of cross section of the solenoid.

**26. What is resonant frequency? Write an expression for the resonant frequency.**

**Ans:** It is a particular frequency of LCR circuit at which current is maximum.

Resonant frequency, $f_0 = \frac{1}{2\pi\sqrt{LC}}$

**27. Write any two applications of Gamma rays**

**Ans:** They are used a) In the treatment of cancer

b) To find the thickness of materials.

c) To find the defects in buried petroleum pipes

**28. Give any two advantages of optical fibres over cable communication system.**

**Ans:** 1. It is cheaper.

2. There is no signal loss.

**29. What is doping? Give an example for trivalent impurity.**

**Ans:** The process of adding impurities to the pure semiconductor is called doping

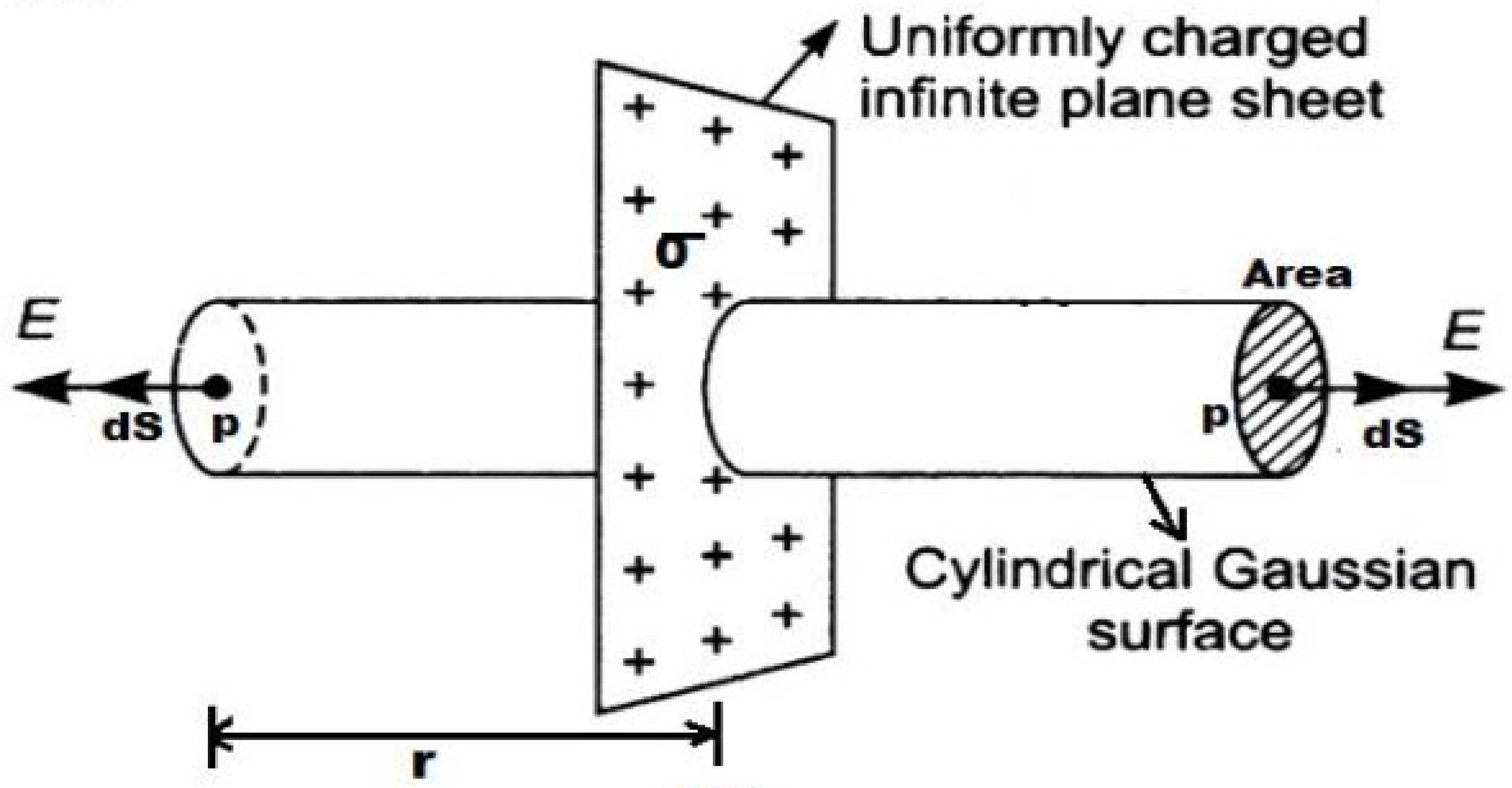
- Boron is trivalent impurity

## PART - C

**IV. Answer any five of the following questions** **$5 \times 3 = 15$**

**30. Obtain an expression for electric field due to uniformly charged infinite plane sheet by using Gauss's law.**

**Ans:**




FIG

In the figure;
E is the electric field
$\sigma$ is the surface charge density on the sheet
r is distance between end face of cylinder and the sheet
q is the charge enclosed by the Gaussian cylindrical surface

Electric flux through the end faces is given by

$$\phi = \sum E\cos\theta\, dS + \sum E\cos\theta\, dS$$

$$= 2E\sum dS \qquad [\because \cos 0^0 = 1]$$

$\phi = 2ES \quad \ldots(1) \qquad$ Where $\sum dS = S$ is the area of each face of the cylinder.

But, $\phi = \frac{q}{\varepsilon_0} = \frac{\sigma S}{\varepsilon_0} \ldots(2) \qquad [\because \sigma S = q]$

From equation (1) and (2), we get

$$2ES = \frac{\sigma S}{\varepsilon_0}$$

$$E = \frac{\sigma}{2\varepsilon_0}$$

**31. Mention any three properties of equipotential surface.**

**Ans: Properties of equipotential surface**

- Work done in moving a test charge between any two points on an equipotential surface is zero.
- The direction electric field is always normal to the equipotential surfaces.
- Two equipotential surfaces cannot intersect.
- Equipotential surfaces are closer in the region of strong electric field.

**32. State and explain Kirchhoff's current law**

**Ans:Statement:** The algebraic sum of the currents at a node in an electrical network is zero.

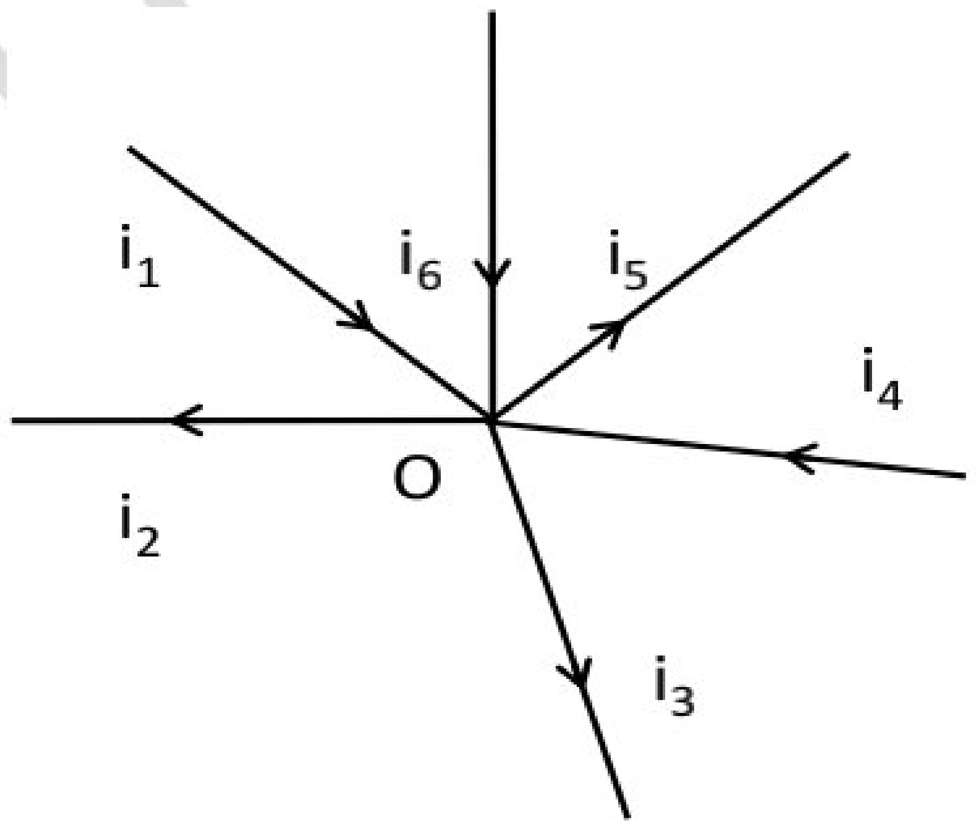
i.e. $\sum I = 0$

**Explanation:**

In the figure, $I_1$, $I_4$ and $I_6$ are the currents entering the junction and $I_2$, $I_3$ and $I_5$ are the currents leaving the junction.

From KCL;

$I_1 + I_4 + I_6 = I_2 + I_3 + I_5$



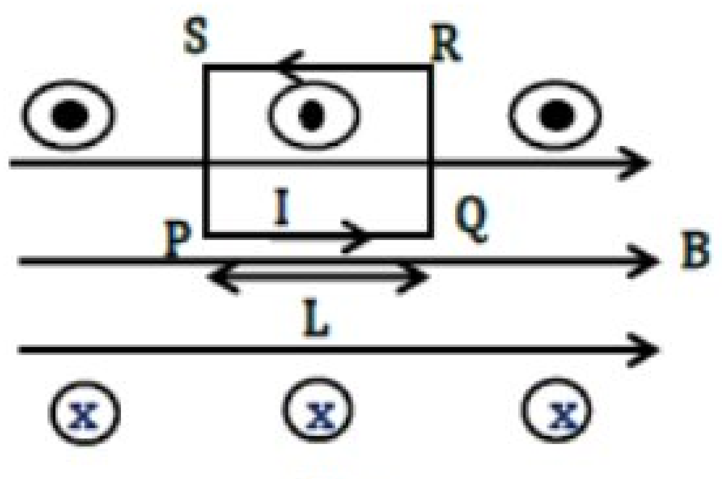
**33.** **Derive an expression for magnetic field at a point inside a long current carrying solenoid**

Ans: Consider a long solenoid carrying current 'I'. Let 'B' be the magnetic field inside the solenoid. Consider a rectangular loop PQRS of length 'L' [Fig]

**From Ampere's circuital law,**

$\oint_{PQRS} \vec{B} . \vec{dl} = \mu_o$[Net currrent enclosed by the loop PQRS]

$\oint_P^Q \vec{B} . \vec{dl} = \mu_o[NI]$



Fig

$B \oint_P^Q dl = \mu_o NI$

$B[L] = \mu_o NI$

$B = \mu_o \left[\frac{N}{L}\right] I$

$B = \mu_o nI$

Where $n = \frac{N}{L}$; Number of turns per unit length of solenoid

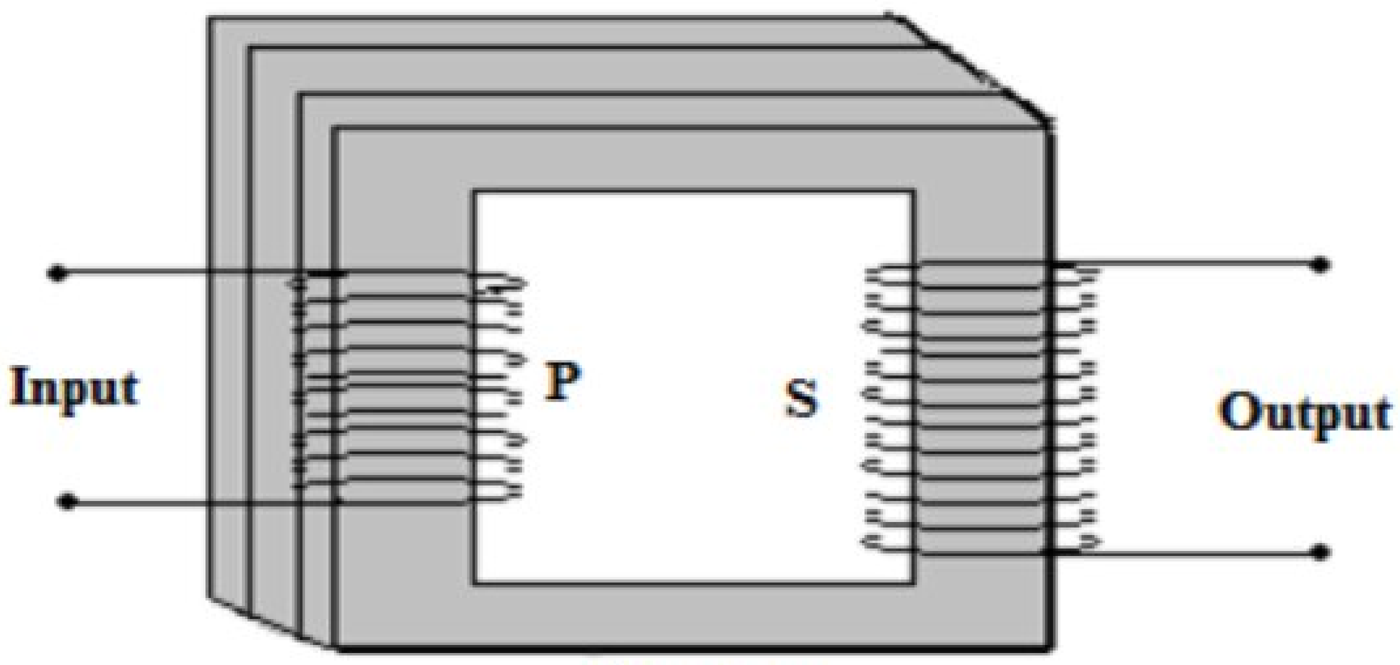
**34.** **Write three differences between diamagnetic and paramagnetic substances.**

**Ans:**

| Diamagnetic substances | Paramagnetic substances |
|---|---|
| Relative permeability is less than one | Relative permeability is slightly more than one |
| Susceptibility is low and negative | Susceptibility is low and positive. |
| They do not obey Curie's law. | They obey Curie's law |

**35.** **With a diagram explain the working of a transformer.**

Ans: **Working:** It works on the principle of mutual induction. As the current through the primary coil varies the magnetic flux linked with the secondary coil also changes. As a result an alternating emf of the same frequency is induced across the secondary coil. The magnitude of the induced voltage depends on the voltage across the secondary coil and also on the number of turns in the primary coil and secondary coil.



Iron core

If $V_p$ and $V_s$ are the input voltage and output voltage respectively and $n_p$ and $n_s$ the number of turns in the primary coil and secondary coil respectively then,

$\frac{V_s}{V_p} = \frac{n_s}{n_p} = T$

Where 'T' is called the turns ratio.

**36.** **State the Cartesian sign conventions used in ray optics**

**Ans:**

- All distances are measured from the pole and along the principal axis.
- The distances measured in the direction of the incident light are taken positive while those measured in the direction opposite to the incident light are taken negative.
- Distances measured upward and perpendicular to the principal axis are considered positive while those measured downwards are considered negative.

**37.** **Define: a] Line emission spectrum, b] Line absorption spectrum and c] spectrum**

**Ans:**

a) It is a spectrum emitted by atomic gas which contains bright lines on a dark background.

b) It is a spectrum which contains dark lines on a bright background.

c) An ordered sequence of wavelength or frequency of radiation is called a spectrum.

**38.** **Calculate the binding energy (in MeV) of $_8O^{16}$ from the following data. Mass of neutron is 1.008665 u, Mass of proton is 1.007825 u and Mass of O -16 is 15.995u.**

**Ans:** Mass defect,

$\Delta m = [Zm_p + (A - Z)m_n] - M$

$\Delta m = [8 \times 1.007825 + (16 - 8) \times 1.008665] - 15.995$

$\Delta m = [8.0626 + 8.06932] - 15.995 = 0.13692$ u.

Binding energy = $\Delta m \times 931$ MeV

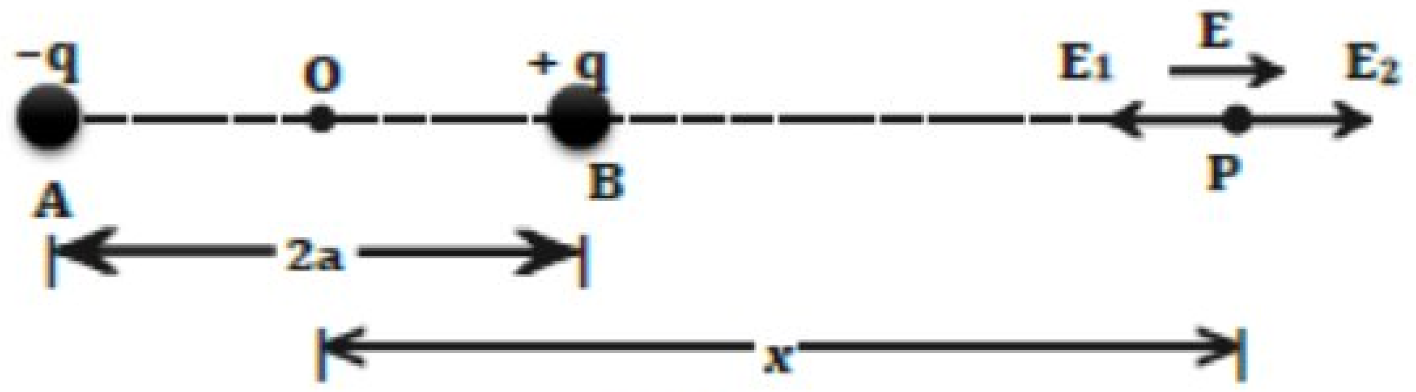
Binding energy = $0.13692 \times 931$ MeV = 127.472 MeV.

## PART - D

**V. Answer any three of the following questions** **$3 \times 5 = 15$**

**39.** **Derive an expression for electric field due to a dipole at a point on the axial line.**

**Ans:** Consider an electric dipole consisting of charges –q and +q separated by a small distance '2a' in free space. Let 'P' be a point on the axial line of the dipole at a distance 'x' from the center 'O' of the dipole (fig).




FIG

Electric field intensity at P due to – q;

$E_1 = \frac{q}{4\pi\varepsilon_0 AP^2} = \frac{q}{4\pi\varepsilon_0 (x+a)^2}$ along PA

Electric field intensity at P due to + q;

$E_2 = \frac{q}{4\pi\varepsilon_0 BP^2} = \frac{q}{4\pi\varepsilon_0 (x-a)^2}$ along BP

Resultant field intensity is given by

$E = E_2 - E_1$ along BP Produced

$= \frac{q}{4\pi\varepsilon_0 (x-a)^2} - \frac{q}{4\pi\varepsilon_0 (x+a)^2}$

$= \frac{q}{4\pi\varepsilon_0}\left[\frac{1}{(x-a)^2} - \frac{1}{(x+a)^2}\right]$

$= \frac{q}{4\pi\varepsilon_0}\left[\frac{(x+a)^2-(x-a)^2}{(x^2-a^2)^2}\right]$

$= \frac{q}{4\pi\varepsilon_0} \frac{4ax}{(x^2-a^2)^2}$

$= \frac{(q \times 2a)}{4\pi\varepsilon_0} \frac{2x}{(x^2-a^2)^2}$

$\therefore E = \frac{p}{4\pi\varepsilon_0} \frac{2x}{(x^2-a^2)^2}$ along BP [ ∵ Electric dipole moment, $p = q \times 2a$]

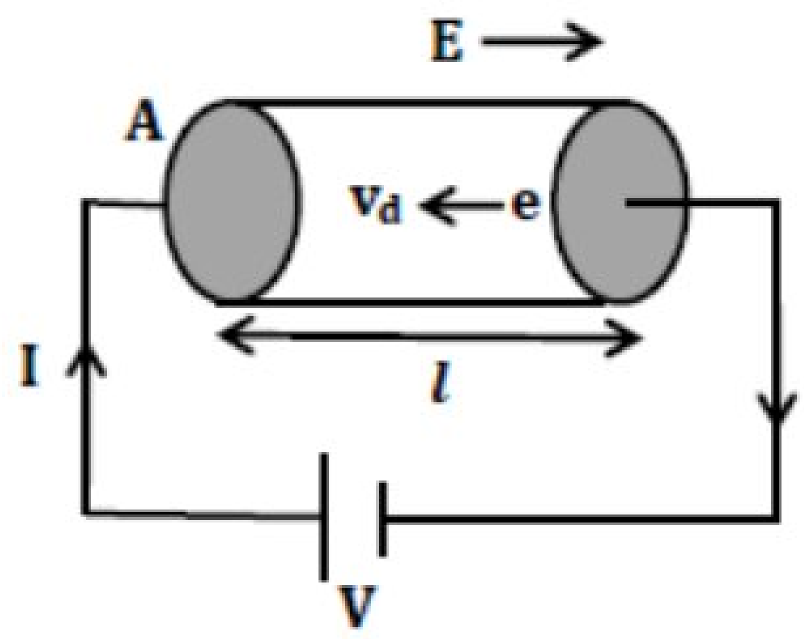
**If the dipole is short ( i.e., a<< x ), then $a^2$ can be neglected as compared to $x^2$**

$\therefore E = \frac{P}{4\pi\varepsilon_0} \frac{2x}{(x^2)^2}$

$E = \frac{1}{4\pi\varepsilon_0} \frac{2P}{x^3}$ along BP

**40. Assuming the expression for drift velocity, derive the expression for conductivity of a material $\sigma = \frac{ne^2\tau}{m}$ where symbols have usual meaning. Define the term mobility.**

**Ans:** In the figure,




I – Current in the conductor

V – Potential difference applied across the conductor

E – Electric field set up in the conductor.

*l* – Length of the conductor

$V_d$ – Drift velocity

A – The area of cross section of conductor

Current density, $J = \sigma E$

$\sigma = \frac{J}{E}$

But $J = \frac{I}{A}$

$\therefore \sigma = \frac{I}{AE}$

But $I = neAV_d$

$\therefore \sigma = \frac{neAV_d}{AE}$

$\sigma = \frac{neV_d}{E}$

But $V_d = \frac{Ee\tau}{m}$

$\therefore \sigma = \frac{ne^2\tau}{m}$

**Mobility** is defined as the magnitude of drift velocity per unit electric field.

**41. Derive the expression for the force between two straight parallel conductors carrying current in same direction and hence define ampere.**

**Ans:** Consider two conductors P and Q carrying the currents $I_1$ and $I_2$ in the same direction. Let 'd' be the separation between the two conductors and L be the length of segment of conductor.

Magnetic field due to current '$I_1$' is

$B = \frac{\mu o}{2\pi}\frac{I_1}{d}$ ......(1) into the plane

Force on the conductor - Q is

$F = BI_2L$ .....(2) towards conductor – P

Magnetic field due to current '$I_2$' is

$B = \frac{\mu o}{2\pi}\frac{I_2}{d}$ ......(3) out of plane

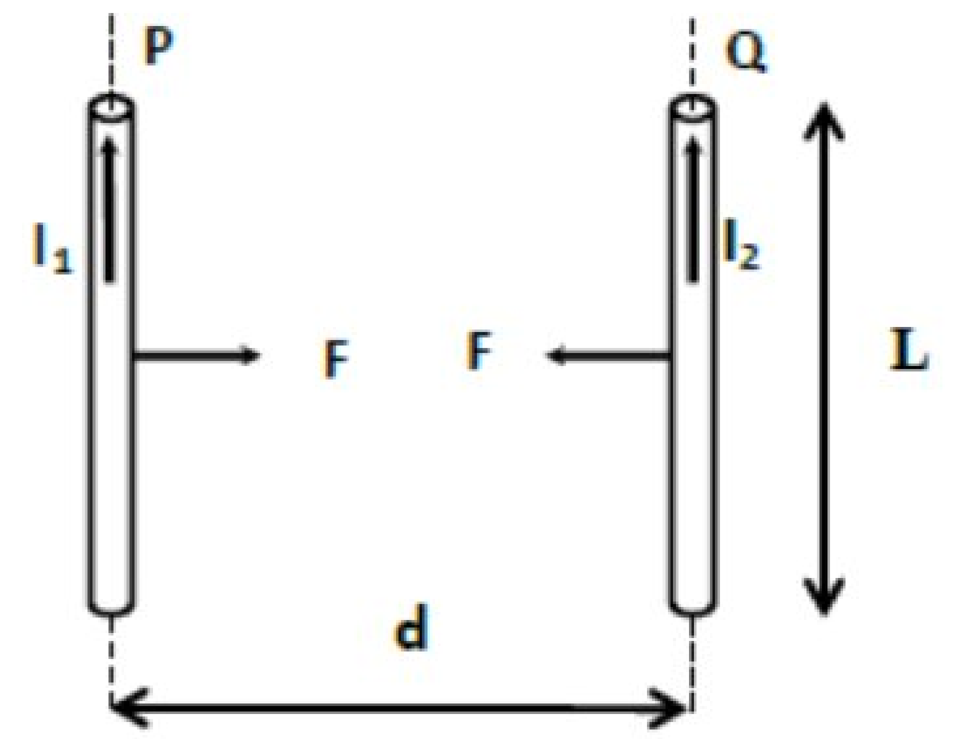
Force on the conductor - P is

$F = BI_1L$ .....(4) towards conductor – Q

Equation (1) in (2) or (3) in (4), we get

$F = \left(\frac{\mu o}{2\pi}\frac{I_1}{d}\right) I_2 L$

$\frac{F}{L} = \frac{\mu o}{2\pi}\frac{I_1 I_2}{d}$

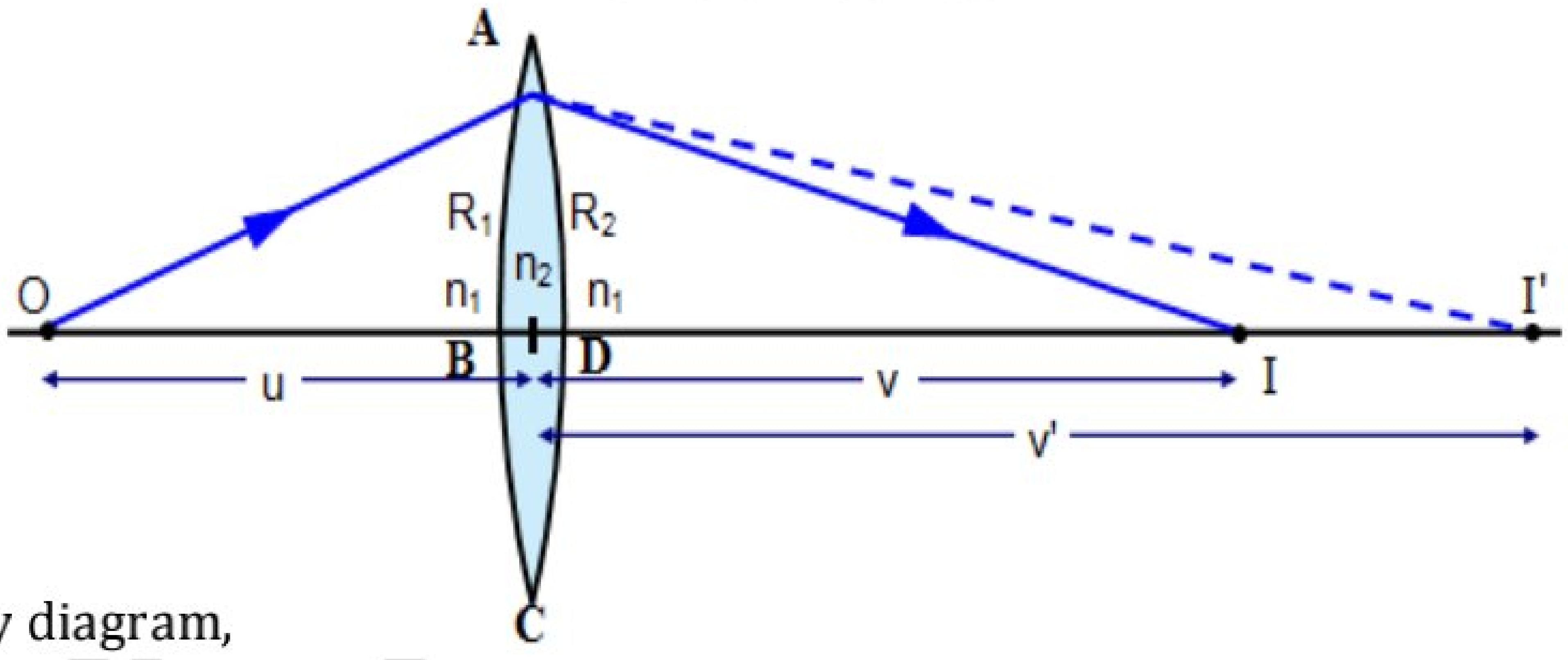


Fig

**Definition of one ampere:** Current in each straight parallel conductor is said to be on ampere when they are separated by a distance of 1m and experience a force per unit length of $2 \times 10^{-7}\ Nm^{-1}$

**42. Derive Lens maker's formula for a convex lens.**

**Ans:** Lens maker's formula gives the relation connecting the focal length of a lens, the refractive index of the material of the lens and the radii of curvature of its surfaces.




In ray diagram,

'O' is the point object placed on the principal axis of the lens.

'$n_2$' is refractive index of thin lens.

'$n_1$' is refractive index of air medium.

ABC and ADC are two refracting surfaces of lens.

$R_1$ and $R_2$ are radii of curvatures of ABC and ADC surfaces respectively.

For spherical surface, we have

$\frac{n_2}{v} - \frac{n_1}{u} = \frac{n_2 - n_1}{R}$......(1)

**Refraction at the first surface ABC (ray moves from air to glass medium)**

O is the object and its image is formed at $I^1$.

$\therefore$ Equ (1) $\Longrightarrow \frac{n_2}{v^1} - \frac{n_1}{u} = \frac{n_2 - n_1}{R_1}$ ......(2)

**Refraction at the second surface ADC (Ray moves from glass to air medium)**

$I^1$ acts as a virtual object and its image is formed at I.

$$\therefore \text{Equ (1)} \Rightarrow \frac{n_1}{v} - \frac{n_2}{v^1} = \frac{n_1 - n_2}{R_2}$$

$$\Rightarrow \frac{n_1}{v} - \frac{n_2}{v^1} = -\left(\frac{n_2 - n_1}{R_2}\right) \ldots\ldots (3)$$

Adding equations (2) and (3), we get

$$\frac{n_2}{v^1} - \frac{n_1}{u} + \frac{n_1}{v} - \frac{n_2}{v^1} = \frac{n_2 - n_1}{R_1} - \left(\frac{n_2 - n_1}{R_2}\right)$$

$$\Rightarrow n_1\left[\frac{1}{v} - \frac{1}{u}\right] = (n_2 - n_1)\left\{\frac{1}{R_1} - \frac{1}{R_2}\right\}$$

$$\frac{1}{v} - \frac{1}{u} = \frac{(n_2 - n_1)}{n_1}\left\{\frac{1}{R_1} - \frac{1}{R_2}\right\}$$

$$\frac{1}{v} - \frac{1}{u} = \left(\frac{n_2}{n_1} - 1\right)\left\{\frac{1}{R_1} - \frac{1}{R_2}\right\}$$

But $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$ [Thin lens formula]

$$\therefore \frac{1}{f} = \left(\frac{n_2}{n_1} - 1\right)\left\{\frac{1}{R_1} - \frac{1}{R_2}\right\}$$

**43. a] What is photoelectric effect**

**b] State the laws of photoelectric effect**

**Ans:** a] The phenomenon of emission of electrons from a metal surface when radiation of suitable frequency is incident on it is known as **Photoelectric effect.**

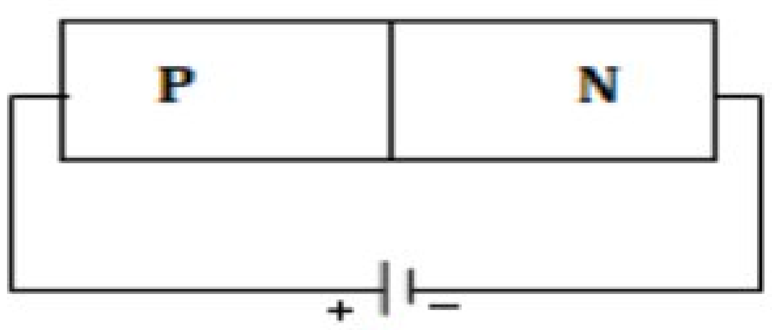
**b]**

- The photoelectron emission is an instantaneous process.
- For a given photosensitive surface, there is a minimum frequency for incident radiation below which there is no emission of photoelectron. This minimum frequency is known as threshold frequency.
- For a given metal, the strength of the photoelectric current is directly proportional to the intensity of the incident radiation.
- Above threshold frequency, the maximum kinetic energy of photoelectrons varies linearly with the frequency of incident radiation.

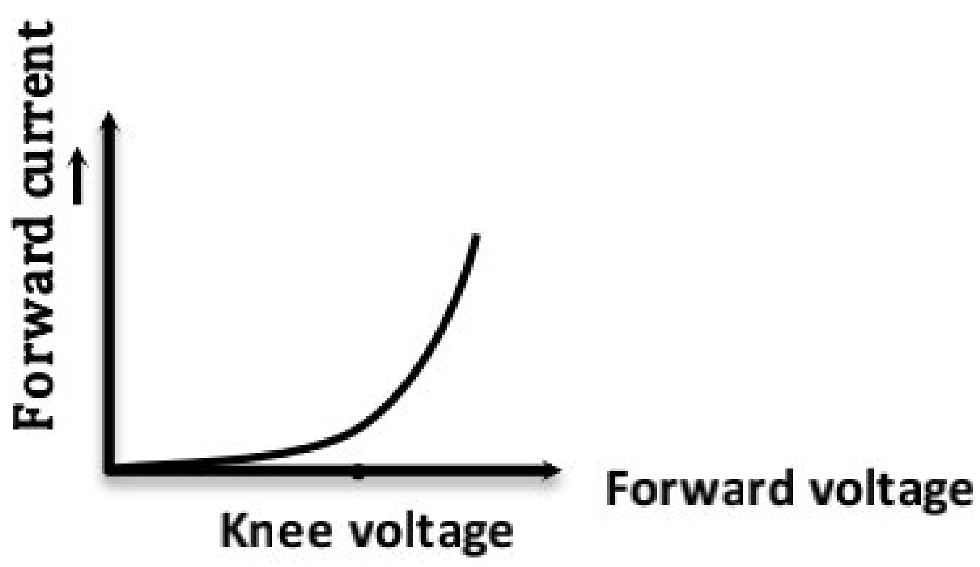
**44. a] When does p-n junction is said to be forwards biased.**

**b] Explain the working of p-n junction in forward bias. Draw the typical characteristic curve.**

**Ans:** When p-type of the semiconductor is connected to the positive terminal of the battery and n-type of the semiconductor is connected to the negative terminal of the battery, then diode is said to be forward biased



Ba
FIG -1



a) When the diode is forward biased, holes are repelled by the positive terminal and electrons are repelled by the negative terminal of the battery.

b) As the bias voltage increases, width of depletion region decreases.

c) When the bias voltage is slightly greater than barrier potential, diode allows current to pass through it.

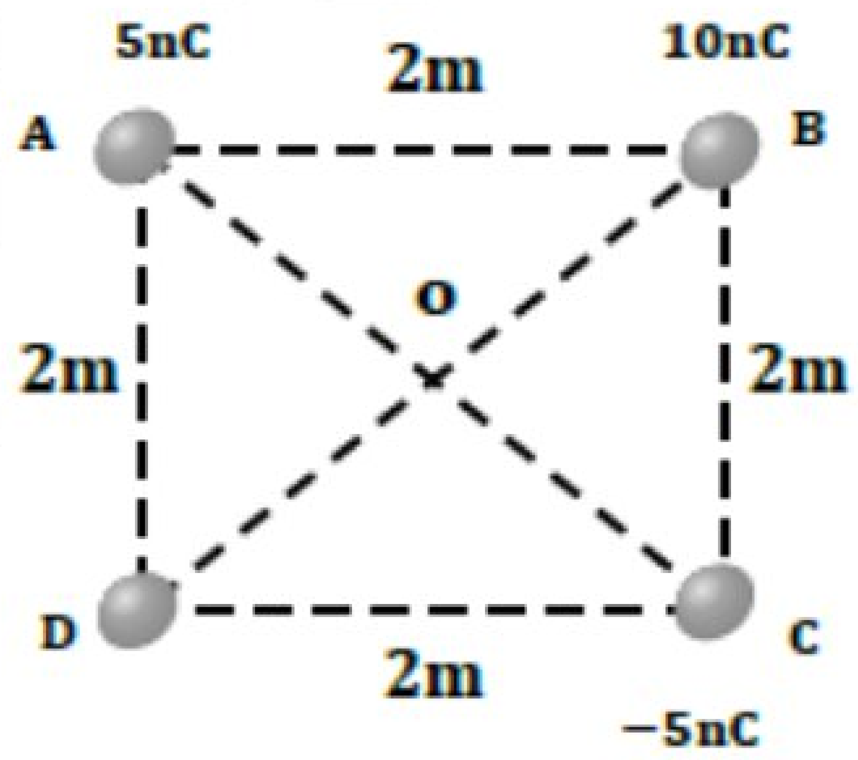
## VI. Answer any two of the following questions $\qquad 2 \times 5 = 10$

**45. ABCD is a square of side 2m. Charges of +5nC, +10nC and −5nC are placed at corners A, B and C respectively. What is the work done in transferring a charge of 5μC from D to the point of intersection of the diagonals?**

**Ans:** Given; $q_A = 5nC$, $q_B = 10nC$, $q_C = -5nC$

Each side of square is 2m (i.e, AB = BC = CD = DA = 2m)

Electric potential, $V = \frac{1}{4\pi\varepsilon_0}\left(\frac{q}{r}\right)$




From figure, $AC = 2\sqrt{2}$ m = BD

And $OA = OB = OC = OD = \sqrt{2}$m

Electric potential at D,

$$V_D = \frac{1}{4\pi\varepsilon_0}\left(\frac{q_A}{AD} + \frac{q_B}{DB} + \frac{q_C}{DC}\right)$$

$$V_D = 9 \times 10^9 \left(\frac{5 \times 10^{-9}}{2} + \frac{10 \times 10^{-9}}{2\sqrt{2}} - \frac{5 \times 10^{-9}}{2}\right)$$

$$V_D = \frac{90}{2\sqrt{2}} \text{ V}$$

Electric potential at O, $V_O = \frac{1}{4\pi\varepsilon_0}\left(\frac{q_A}{OA} + \frac{q_B}{OB} + \frac{q_C}{OC}\right)$

$$V_O = 9 \times 10^9 \left(\frac{5 \times 10^{-9}}{\sqrt{2}} + \frac{10 \times 10^{-9}}{\sqrt{2}} - \frac{5 \times 10^{-9}}{\sqrt{2}}\right)$$

$$V_O = \frac{90}{\sqrt{2}} \text{ V}$$

Potential difference, $V = V_O - V_D = \frac{90}{\sqrt{2}} - \frac{90}{2\sqrt{2}} = \frac{90}{2\sqrt{2}} = \frac{45}{\sqrt{2}} = 31.8246$ V

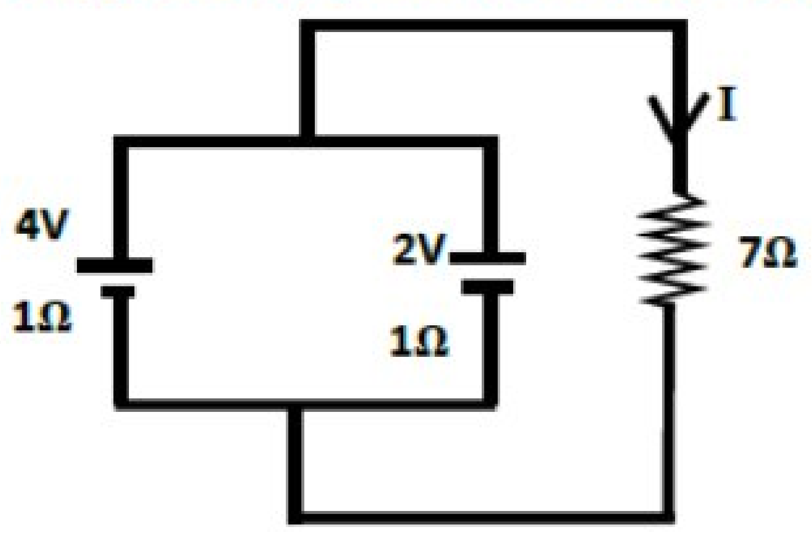
Work (W) = p .d × (5μC Charge transferred from D to O)

$W = V \times q$

$W = 31.8246 \times 5 \times 10^{-6}$

$W = 159.123 \times 10^{-6}$ J

**46. In the following circuit, find the current 'I'.**



**Ans:** Ans: Equivalent emf, $E_{eq} = \frac{E_1 r_2 + E_2 r_1}{r_1 + r_2}$

$$= \frac{4 \times 1 + 2 \times 1}{1+1} = 3 \text{ V}$$

Equivalent internal resistance, $r_{eq} = \frac{r_1 r_2}{r_1 + r_2}$

$$= \frac{1 \times 1}{1+1} = 0.5\ \Omega$$

Current, $I = \frac{E_{eq}}{R + r_{eq}} = \frac{3}{7 + 0.5} = 0.4$ A

**47. A conductor of length 3m moving in a uniform magnetic field of strength 100T. It covers a distance of 70m in 5 Sec. Its plane of motion makes an angle of $30^0$ with direction of magnetic field. Calculate the emf induced in it.**

**Ans:** Given: l = 3 m, B =100 T, d = 70m, t = 5 s and $\theta = 30^0$

Emf, $e = BlV \sin\theta = B\, l \left[\frac{d}{t}\right] \sin\theta$

$$= 100 \times 3 \times \left[\frac{70}{5}\right] \sin 30^0$$

$$= 300 \times 14 \times 0.5$$

e = 2100 V

**48. Calculate the distance between fifth and fifteenth bright fringes in an interference pattern obtained by experiment due to narrow slits separated by 0.2mm and illuminated by light of wavelength 560nm. The distance between the slit and screen is 1m.**

**Ans:** Given: d = 0.2mm, $\lambda$ = 560nm and D =1 m

Fringe width, $\beta = \frac{\lambda D}{d} = \frac{560 \times 10^{-9} \times 1}{0.2 \times 10^{-3}} = 2.8$ mm

Distance of $n^{th}$ bright fringe, $x_n = \frac{n\lambda D}{d} = n\beta$

For $5^{th}$ bright fringe, $x_5 = 5 \times 2.8$ mm = 14 mm

For $15^{th}$ bright fringe, $x_{15} = 15 \times 2.8$ mm = 42 mm

The distance between $15^{th}$ and $5^{th}$ bright fringe,

$x = x_{15} - x_5 = 42$ mm – 14 mm = 28 mm

NEVER STOP LEARNING!!

ALWAYS, GIVE YOUR BEST!!

**ALL THE BEST, DEAR STUDENTS**