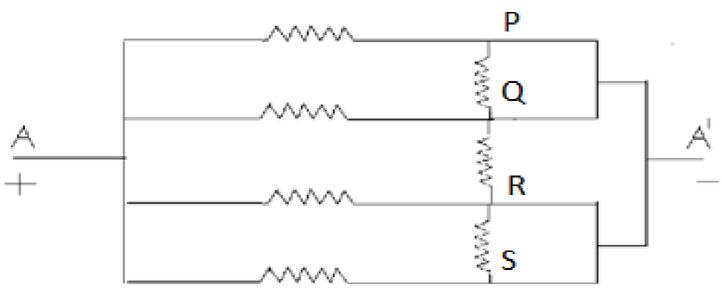
PHYSICS SAMPLE PAPER

1)

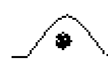
a) Prove that for a photon its frequency is given by $\frac{wB0}{E0\ \mu0\varepsilon0}$ where w is wave number and other symbols have their usual meaning.

b) Write an expression for electric field. $B_y = B_0$ Sin $[2\pi *2*10^3 x]\ \hat{j}$
Here the electromagnetic wave moves along positive z-axis

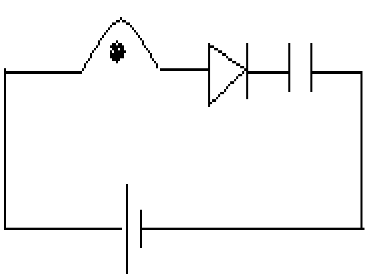
2) Find the net resistance if the resistance of each resistor is 1Ω.



3)

1) In which of the following circuits will the bulb stop glowing after some time? In which case will it continue?  Represents a bulb.

a)



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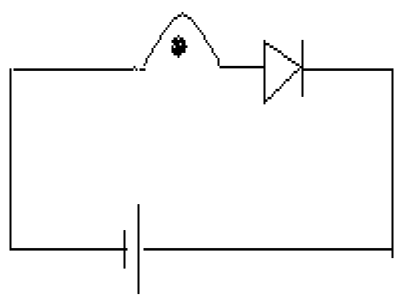
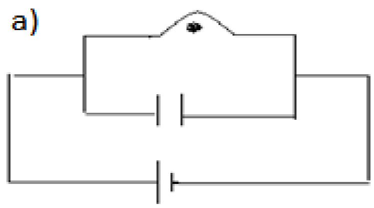
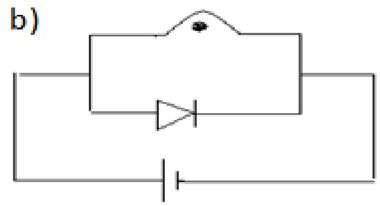


n

2) In which of the following the bulb glow?



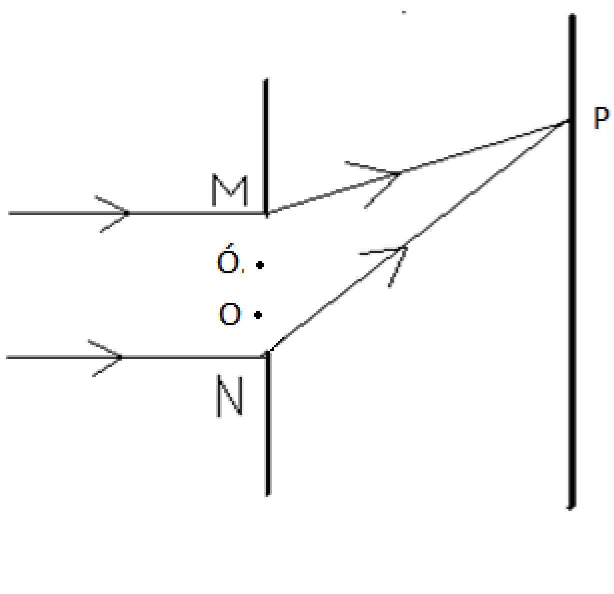


4) Consider the following diffraction patter where MN is a slit which is divided into 3 equal parts by 2 imaginary points O and Ó.

The position of first bright fringe is given by a point P. Waves from M and O have a phase difference 2π at P. What will you observe if?

a) ON is closed

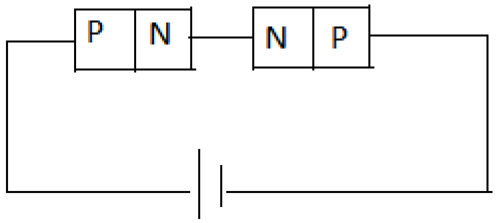
b) OÓ is closed



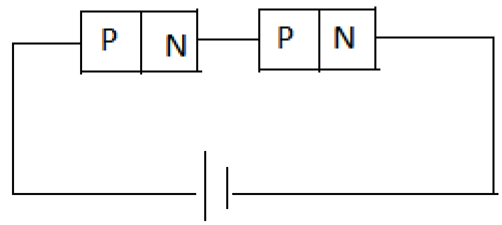
5) Give one example of organic and in-Organic semi conductor each.

6) In which cases the potential across p-n junction is same?

a)



b)



7) Consider the following nuclear reaction in which A decomposes to B which then decomposes to C where, λ_1 and λ_2 are respective decay constants. $A \xrightarrow{\lambda_1} B \xrightarrow{\lambda_2} C$

At any time t the concentration of A and B are A_t and B_t respectively. Find the rate of change of concentration of B and C.

8) If Phase difference between potential difference and current in a RL circuit is 90 degree, find the time lag between them where power is supplied by an A.C. source of frequency 10 Hz.

9)

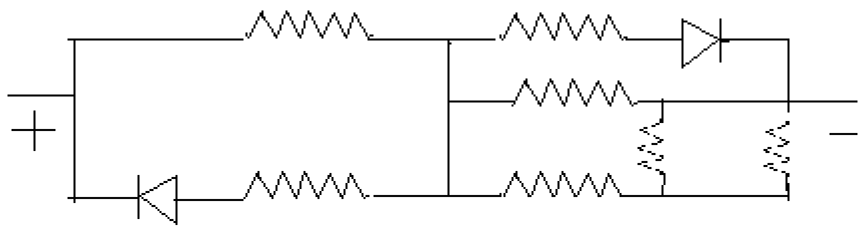
a) A light of energy $6.48 * 10^5$J is falling with a speed of $3 * 10^8$ m/sec. Find the total momentum delivered.

b) Find the E_{rms} of electric field in electromagnetic wave of Intensity 0.022 W/m^2.

10)

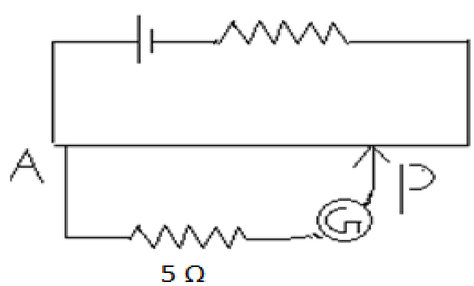
a) Draw the circuit diagram for a p-n-p transistor under active region and represent the depletion region.

b) Find the net resistance if the resistance of each resistor is 1 Ω.

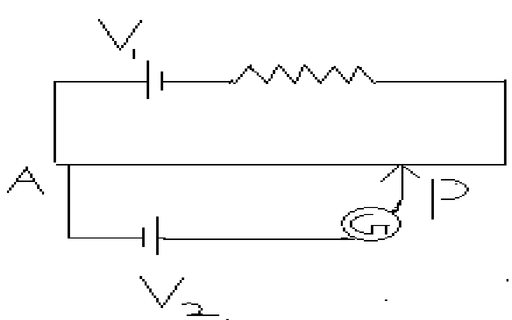


11)

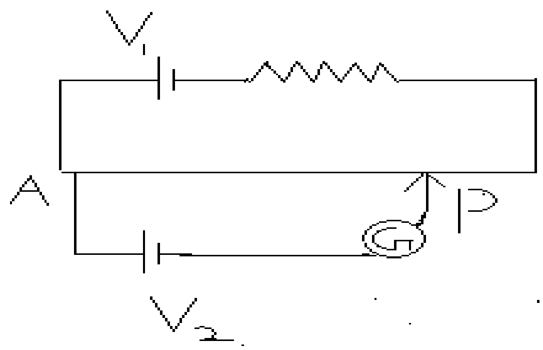
a) Let the potential gradient be 5 V/m in a potentiometer. Let 10 A of current flow through the potentiometer wire and current the through 5 Ω resistor is Zero. Find the position of null deflection from end A.



b) Find the point where null deflection occurs ($V_1 > V_2$)



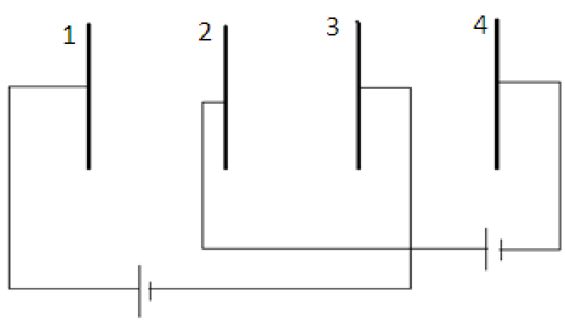
C) Let the current through galvanometer is Zero. Will current flow through AP (Potentiometer wire) under this condition.



12)

a) Consider 2 concentric hollow metallic spheres of radii r and R and having charges +q and +2q respectively. If they are connected by a wire, the direction of flow of current is from sphere of radius --------to radius -------------- Note(R>r)

b) Four plates are connected to 2 different batteries of same volt as shown below.(Note: the wires of the battery meet each other and the magnitude of surface charge density of each plate is σ). Find the electric field between second plate and third plate.



13)

(1) Which is true?

a) More Binding energy means more stability.

b) More Binding energy per nucleon means more stability.

(2) Let the half life of 235 g of ^{235}U be x years, Find the half life of 117.5 g of ^{235}U.

14) Name the different layers of atmosphere and the frequencies that the respective layers affect.

15) Give the wave length range of x rays and mention how they are produced.

16) If in a LCR circuit

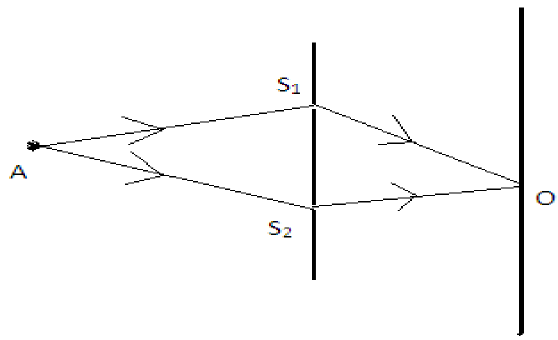
$$LC = \frac{1+RC\omega}{(\omega^2)}$$

Find the phase difference between current and volt.

17)

a) Give the size of central bright maximum when a convex lens of focal length f is placed between slit and screen in diffraction experiment.

b) The experimental set up for interference pattern is given below, where the light source has a initial phase difference of $\frac{\pi}{2}$ at the slit. (Waves at S_1 lead waves at S_2). Find the distance of second bright fringe from the actual centre.(Here actual centre means the point of central maxima when the initial phase difference between the source is zero)



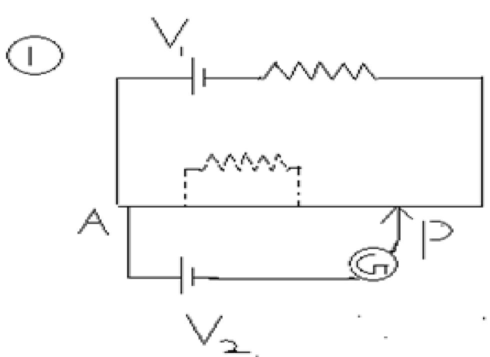
18)

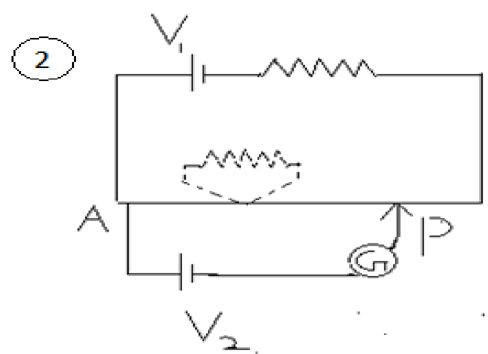
a) If de-Broglie wave length of a body equals the wave length of a photon, show that the kinetic energy of the body cannot be equal to energy of the photon.

b) A bomb is at rest. It breaks into 2 parts, of which one is of 2/9 th original mass with a kinetic energy x Joules. Draw a graph between root of kinetic energy of object of mass 2/9 the original **(i.e.) √x.** and the de Broglie wave length of another the 7/9 the original. Note: Total energy is converted into kinetic energy only.

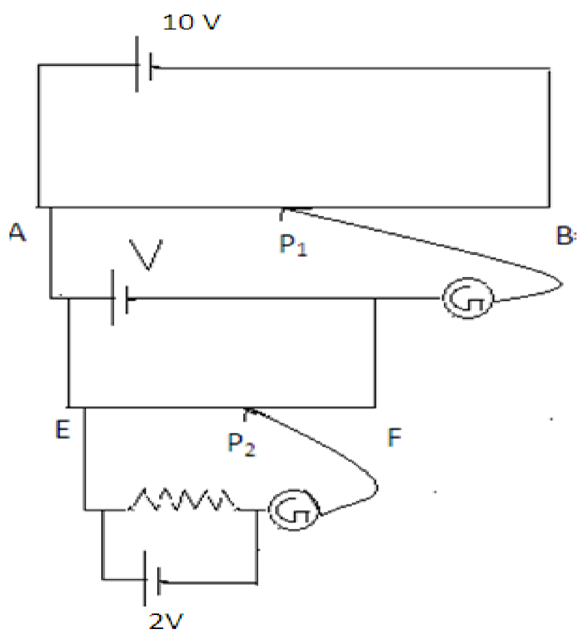
19)

a) In which of the following case the potentiometer measurements lead to error as extra resistance is added to potentiometer wire? Why?





b) The following is a potentiometer setup. Find the balancing length from E for zero current through 2 galvanometers of resistance 2 Ω each. The resistance of AB and EF is uniformly distributed across its length.



Resistance of AB=100 Ω

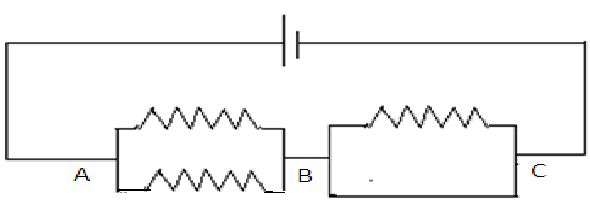
Length of AB is 100 cm

Length of AP_1 is 50 cm

Length of EF is 100 cm

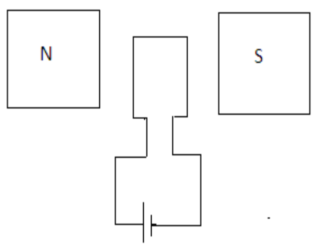
Length of EP_2 is l cm

C) Find the net resistance of the following circuit where resistance of each resistor is 1 ohm and the connections are made by cupper wire.



20)

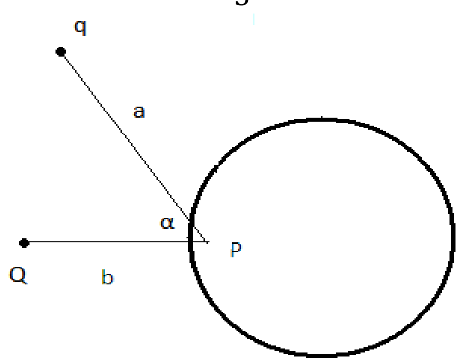
a) Give the direction of magnetic moment and state the law to give it. Also give the direction of torque.



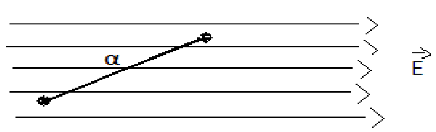
b) In which case will the direction of angular momentum and orbital angular momentum of a charge be in opposite direction (negative or positive)?

21)

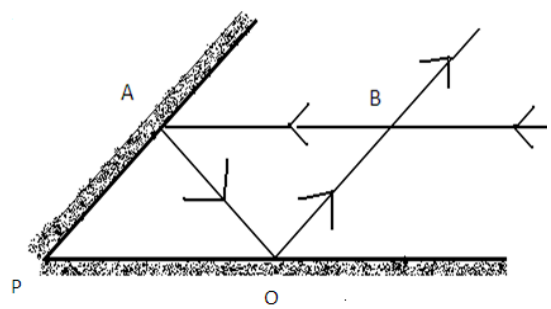
a) In the given figure, 2 point charges q and Q are kept at a distance 'a' and 'b' from a point P within a hollow metallic sphere having Charge Q. Find electric field by metallic sphere at the point P. Here angle α is $\frac{\pi}{3}$.



b) Find the magnitude of torque where a dipole of charge $\pm 2 * 10^{-3}$ c is kept in a uniform Electric field of magnitude $5*10^{3}$ N/q with a distance of 1 m between them. The angle α is 120 degree.



22) Two plane mirrors are inclined at an angle 60 degree with each other. A ray of light parallel to ground is incident on one of the mirror at an angle of 60 degree with respect to it. After reflection at both the mirrors it interferes with its source at a point B. Find the possible values of length of mirror (length of AP) if at the point B constructive interference takes place.



23)

a) Why load resistor is connected ion parallel to the diode in using a Zener diode?
b) What role does time constant play in a full wave rectifier with a capacitor as filter? Give the formula.
c) Inside a crystal each electron will have different energy level. Why?

24)

a) Half life of 200 gm of a substance A is 2 years. Find time taken to change from 25 gm to 6.25 gm.

b) Answer the following question using Thomson's model and Rutherford's model of atom.

Keeping other factors fixed, it is experimentally found that for small thickness t, the number of alpha particle scattered at modern angles is proportional to t. What does this clue provide on linear dependence on t provide?

c) Give the following nuclear reactions

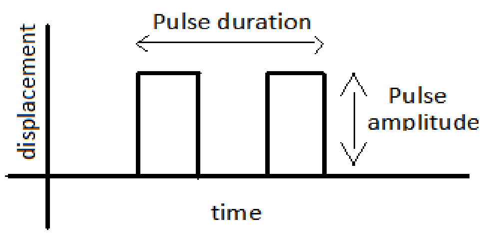
1) β^+ decay of ^{97}Tc.

2) Electron capture of ^{20}Xe.

25)

a) What is the function of band pass filter?

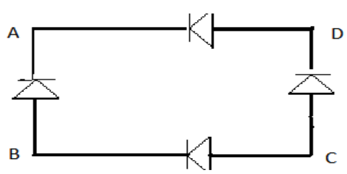
b) Are the following markings correct for a pulse shaped signals?



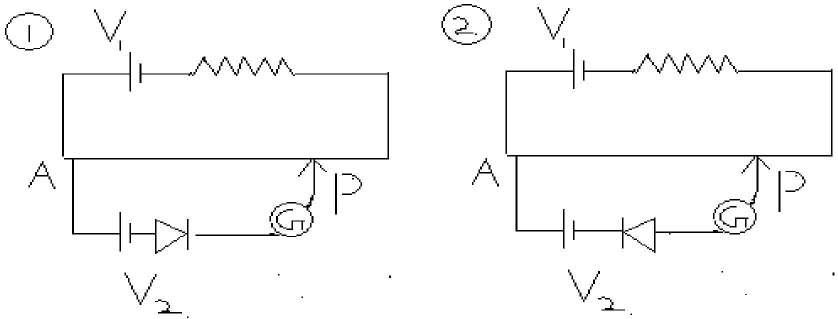
c) Give the condition to avoid distortion. $A_c>=A_m$ or $A_m>=A_C$ in amplitude modulation?

26)

a) In the given figure consisting of p-n junction diode the input is across A and C and the output is between B and D.Is the output full wave rectified or half wave rectified?



b) How the position of null deflection changes when a pn junction diode is attached in the following manner?

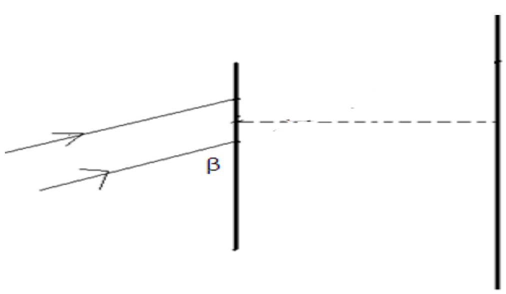


c) Why is photodiode used under reverse bias condition, though forward bias current is more?

27)

a) Two coherent sources whose intensities are in ratio n undergo interference. Find the ratio of maximum intensity to minimum intensity.

b) A coherent parallel beam falls on Young's double slit apparatus. If the incident beam makes angle of β=60 degree, find the distance of central maximum from the actual centre of the screen. The distance between the screen and the slit is 1000 cm.



28)

a) Find the maximum amplitude of superposition of given 2 waves.

Wave 1 -----> $y_1 = 2\text{Cos}2x + \frac{\sqrt{3}-1}{2}$

Wave 2 ----->$y_2 = 2\text{Cos}^3 2x - \text{Cos}2x + 2\text{Cos}2x.\text{Sin}^2 2x$.

b) Find resultant wave when the following waves superimpose

$y_1 = a\ \text{Sin}4\omega t$

$y_2 = a\ \{3\text{Sin}\omega t\ (\text{Cos}\omega t\text{Cos}\phi) - 3\text{Sin}\omega t\ (\text{Sin}\omega t\text{Sin}\phi) - 4\text{Sin}^3 x\ (\text{Cos}\omega t\text{Cos}\phi) + 4\text{Sin}^3\omega t\ (\text{Sin}\omega t\text{Cos}\phi) + \text{Cos}3\omega t\text{Sin}\ (\omega t+\phi)\}$

29)

a) A non conducting spring which obeys hook's law is connected to a current (I_a) carrying conductor of infinite length. To the other end of the spring another current (I_b) carrying conductor of length l is attached. The direction of current in each conductor is same. Due to the force between the conductors the length of the spring extends by y from mean position. Find the spring constant.

b) Consider 3 infinite wires carrying current along x, y and z axis respectively. Find the magnitude of net magnetic field at a point (X, y, z).

c) What is Meissner effect?

d) 1) Classify the following as paramagnetic or diamagnetic

a) Platinum b) Gold

2)Give the Unit of Relative magnetic permeability.

ANSWERS

1)

a) $\nu = \frac{c}{\lambda}$

Multiply and divide c, $\nu = \frac{c^2}{\lambda c}$

As $1/\lambda$ = W(wave number) , $E_0 = cB_0$ and $(\mu_0\varepsilon_0)^{1/2} = \frac{1}{C}$

We get, $= \frac{wB}{E0\ \mu0\varepsilon0}$

b) $B_y = B_0 \text{Sin}\ [2\pi * 2 * 10^3 x]\ \hat{j}$

As $E_0 = cB_0$ we get, $E_X = cB_0 \text{Sin}\ [2\pi * 2 * 10^3 x]\ \hat{i}$

The direction of propagation of electromagnetic wave is given by the cross product of electric field and magnetic field, ExB.

2) As all the resistances are same potential at P, Q, R, S are same. So the potential difference between P and Q, Q and R, R and S are zero, so there is no flow of current in these arms.

So net resistance is,

$\frac{1}{R} = \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} = 4.$

$R = \frac{1}{4}\Omega.$

3)

1) a) Stop after some time because of capacitor.

b) Bulb does not glow as it is in reverse bias.

2) In both the cases the bulb will glow.

4)

a) Dark.

Waves from M and O cancel each other at P as they are apart by phase angle 2π at point P.Therefore Waves from part ON produce brightness on the screen. But as they are blocked it will turn dark.

b) Bright.

5)

a) In organic: CdS, GaAs, CdSe, InP.

b) Organic: Anthracene, doped thalocyonines.

6) In Case b) potential is same across both the diodes.

7) Rate of change of concentration of B is $\lambda_1 A_t - \lambda_1 B_t$

Rate of change of concentration of C is $\lambda_1 B_t$ (Note that this quantity is positive).

8) 90 degrees is $\frac{\pi}{2}$ rad.

$$\frac{2\pi}{T} = \frac{\varphi}{t}$$

$$t = \frac{\pi/2}{10 * 2\pi} = \frac{1}{40} \text{ seconds.}$$

9)

a) p(momentum) =U(Energy)/c(light speed)

$= 2.16 * 10^{-3}$.

b) Intensity = $\varepsilon_0 E^2_{rms} c$

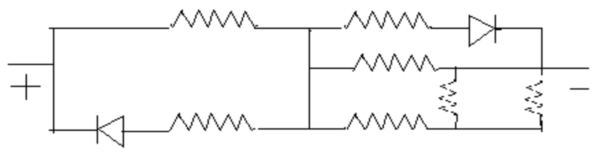
$= 2.9$ V/m

10)

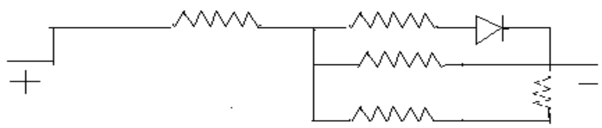
a) Refer NCERT Fig 14.28 a)

Note(depletion region must be shown)

b)



The circuit can be redrawn as



Net resistance is $\frac{7}{5}\,\Omega$.

11)

a) Zero Units from A.

b) No null deflection as battery V_2 is reversed.

c) Yes.

12)

a) Potential of sphere of radius R is given by

$$V_R = \frac{2q}{4\pi\varepsilon 0\ R} + \frac{q}{4\pi\varepsilon 0\ R}$$

For radius r potential is

$V_r = \frac{2q}{4\pi\varepsilon 0 \text{ R}} + \frac{q}{4\pi\varepsilon 0 \text{ r}}$

$V_r - V_{R} = \frac{q}{4\pi\varepsilon 0}\{\frac{1}{r} - \frac{1}{R}\}$

As R>r, $V_r - V_R =$ positive or $V_r > V_R$. As positive charge flows from higher potential to lower potential current flows from r to R.

b) Net electric field is $\frac{\sigma}{\varepsilon}$

Electric field due to plate 2 is zero and electric field due to plate 3 is also zero as both are neutral.

Electric field is only due to plates 1 and 4 which are oppositely charges and acts along opposite direction, so they add up.

$E = \frac{\sigma}{2\varepsilon} - (-\frac{\sigma}{2\varepsilon}) = \frac{\sigma}{\varepsilon}$

13)

1)

a) False.

Binding energy of ^{235}U is more than that of ^{56}Fe; but ^{56}Fe is more stable than ^{235}U.

b) True

2) X years.

14) Refer NCERT text book Table 15.3

15) Wavelength range of X-rays 1 nm to 10^{-3} nm. When high energy electrons are bombarded against a metal X-rays are produced.

16) From the question we get $LC\omega^2 = 1 + RC\omega$

$LC\omega^2 - 1 = RC\omega$

Divide both the sides by $C\omega$

$L\omega - \frac{1}{C\omega} = R$

Divide both the sides by R.

$\frac{L\omega - \frac{1}{c\omega}}{R} = 1 = \text{Tan}45.$

Thus $\phi = \frac{\pi.}{4}$

17)

a) $\frac{f\lambda}{a}$

b) For central bright fringe the net path difference is zero, so

$AS_1 + S_1O - AS_2 - S_2O = 0;$

$AS_1 - AS_2 + \frac{xd}{D} = 0;$

$AS_1 - AS_2 = -\frac{xd}{D}$ -----> result 1 (Thus the position of central bright fringe is below the actual centre as it is negative)

$\frac{\pi/2}{y} = \frac{2\pi}{\lambda}$ where y is initial path difference

$y=\frac{\lambda}{4}$ = AS_1 - AS_2 (Substitute in result 1)

x= - $\frac{D\lambda}{4d}$

Distance of second bright fringe is $\frac{2\lambda D}{d}$ from actual center

But as the central maxima is displaced, the distance of second maxima

Above the central bright fringe is x = $\frac{2\lambda D}{d} + \frac{\lambda D}{4d} = \frac{9\lambda D}{4d}$

And the one below is at a distance x=$\frac{2\lambda D}{d} - \frac{9\lambda D}{4d} = \frac{-\lambda D}{4d}$

18)

a) For a photon E=$\frac{hc}{\lambda}$

De Broglie wavelength of the body is λ=$\frac{h}{mv}$ -------> result 1

Kinetic energy of the body is $\frac{1}{2}mv^2$

From result 1 kinetic energy is $\frac{hV}{2\lambda}$

As it is equal to energy of photon $\frac{hV}{2\lambda} = \frac{hc}{\lambda}$

It gives V=2c. But it cannot happen as according to Sir Albert Einstein's Special theory of Relativity, No object can travel at a speed more than that of light.

b) Let m be the mass of unbroken bomb.

As momentum is conserved in this $\frac{2}{9}mV_1 + \frac{7}{9}mV_2 = 0$ (as, before breaking the bomb was at rest, so its initial momentum is zero)

So, $\frac{2}{9}mV_1 = -\frac{7}{9}mV_2$

Kinetic energy of object of mass $\frac{2}{9}m$ is x.

So, $(\frac{2}{9}mV_1)^2 / 2\frac{2}{9}m = x$. As $(p^2/2m = x)$

$\frac{2}{9}mV_1 = \frac{2}{3}(mx)^{1/2}$

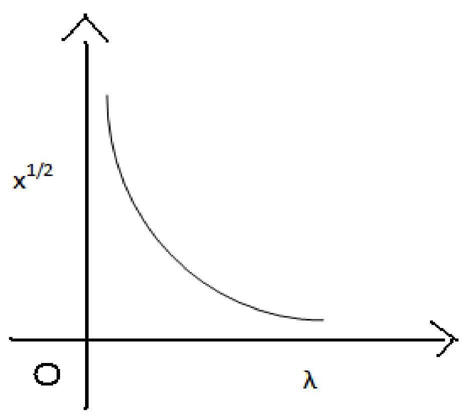
$= \frac{7}{9}mV_2$ (see only magnitude)

$= \frac{h}{\lambda}$ where h is plank's const. and λ is de-Broglie wavelength.

So, $\frac{h}{\lambda} = \frac{2}{3}(mx)^{1/2}$

$x^{1/2} = \frac{3h}{2\lambda}(m)^{-1/2}$

$X^{1/2} = \frac{k}{\lambda}$ Where k is constant $(\frac{3h}{2}(m)^{-1/2})$



19)

a) More error occurs in 1(first diagram)

As the wires are apart, the ends of the wire experience some potential difference due to which current flows through the false resistor and affect the originality.

(Another method)

Consider the part of potentiometer between the ends of wire as some resistor and calculate net resistance.

b) Potential difference between E and P_2 is also 2V as the current through the adjacent galvanometer is zero.

$\frac{10V}{AB} = \frac{V}{AP1}$

V =5volt

Potential along the 2 ohm resistor is 2 Volt only as it is in series with the battery, so

$\frac{V}{EF} = \frac{2}{EP2}$ So, EP_2 = 40 cm

C) Resistance between A and B

$\frac{1}{R} = \frac{1}{1} + \frac{1}{1}$ = 2 So, $R = \frac{1}{2}\,\Omega$

Resistance between B and C

$\frac{1}{R} = \frac{1}{1} + \frac{1}{0} = \infty$ (as the resistance of Cu is very less)

R = 0

Net resistance is $\frac{1}{2}\,\Omega$.

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20)

a) Direction of magnetic moment is Downwards.

Curl the palm of your right hand along the loop with fingers pointing the direction of the current thumb finger gives the direction of in magnetic moment.

b) Electron

21)

a)

Inside the sphere net electric field is zero

$E_{Sphere} + E_q + E_Q = 0$

$E_{Sphere} = -E_q - E_Q$

$E_{Sphere} = -\sqrt{((E_q)^2 + (E_Q)^2 + 2 E_p E_Q Cos\alpha)}$

$= -\frac{1}{4\pi\varepsilon}\sqrt{\{(\frac{q}{a})^2 + (\frac{Q}{b})^2 + (\frac{Qq}{ab})\}}$

b) $\tau = q\, dE\, Sin\alpha$

$=2*10^{-3}*1*5*10^{3}*Sin\ (180-120)$

$=10*Sin\ (\frac{\pi}{3})$

$=5\sqrt{3}$ Nm

22) As light makes an angle of 60 degree w.r.t to mirror, the angle of incidence is 30 degree. Note that triangle APO and triangle AB0 are equilateral.

$BA - \frac{\lambda}{2} + AO - \frac{\lambda}{2} + OB = n\lambda$ (As constructive interference takes place)

Where n =0, 1, 2…. (Here $\frac{\lambda}{2}$ is subtracted as light is reflected and so it undergoes a phase difference of π.)

So, BA + OB + AO = (n+1) λ

3A0= (n+1) λ (As the triangle AOB is equilateral)

A0 = AP (As the triangle AOP is equilateral)

So, AP = $\frac{(n+1)\lambda}{3}$ Where n =0, 1, 2....

23)

a) Potential is same across the parallel wires.

b) Rate of fall of volt across the capacitor depends upon the inverse of product of capacitance and resistance called time constant.
T=RC

c) Inside a crystal each electron has unique position and no two electrons experience similar pattern of surrounding charges.

24)

a) $\frac{N}{N0} = (\frac{1}{2})^{t/T}$

Time taken to change from 200 gm to 25 gm is

$\frac{25}{200} = (\frac{1}{2})^{t/T}$ so, t1 = 6 years

Time taken to change from 200 gm to 6.25 gm

$\frac{6.25}{200} = (\frac{1}{2})^{t/T}$ so, t_2 = 10 years

Time taken to change from 25 gm to 6.25 gm is

$T = t_2 - t_1 = 4$ years

b) It suggests that the scattering is predominantly due to a single collision, because the chance of a single collision increases linearly with the number of target atoms, and hence linearly with thickness.

c) ^{97}Tc -----> $^{97}Mo + e^{+}$ + antineutrino
$^{120}Xe + e^{+}$ ------> ^{120}I + neutrino

25)

a) A band pass filter rejects low and high frequencies, rejects dc and allows a band of frequencies to pass through.

b) No, pulse duration is marked wrongly

c) $\mu <= 1$ or $A_m <= A_c$

26)

a) Full wave rectified.

b)

1) No change as under null deflection no current flows through the diode. So its presence is not experienced.

2) Same as 1)

c) Refer NCERT Example 14.6

27)

a) Intensity = k*(amplitude) ^{2}

Let the amplitude of 2 waves be b and a.

Ratio of their intensity is n, so $Ka^2 / kb^2 = n$

$(\frac{a}{b}) = \sqrt{n}$

Add 1 on both sides so we get

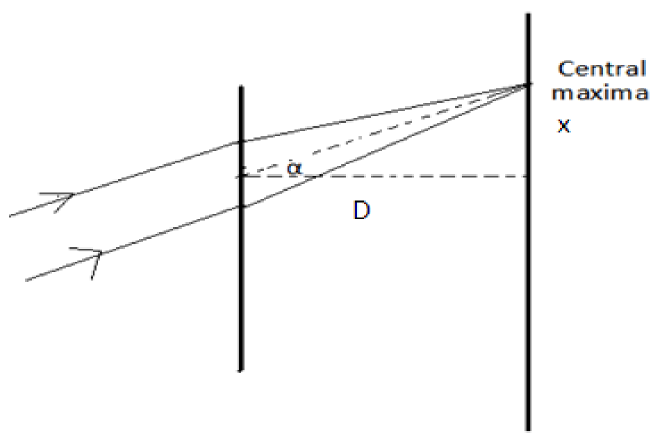
$\frac{a+b}{b} = \sqrt{n} + 1$ similarly $\frac{a-b}{b} = \sqrt{n} - 1$

On dividing first result by second we get $\frac{a+b}{a-b} = \frac{\sqrt{n}+1}{\sqrt{n}-1}$

On squaring it & multip & divid by k we get $(\frac{k(a+b)}{k(a-b)})^2 = (\frac{\sqrt{n}+1}{\sqrt{n}-1})^2$

Thus the ratio of max intensity to min intensity is $(\frac{\sqrt{n}+1}{\sqrt{n}-1})^2$

b) As β = 60, α = 30



Sin α = $\frac{1}{2}$

$\frac{x}{D} = \frac{1}{2}$

$x = 0.5$ m

28)

a) Wave y_2 can be written as

$Y_2 = \text{Cos}2x\,[2\text{Cos}^2 2x - 1] + 2\text{Cos}2x\,(2\text{Sin}x\text{Cos}x)^2$

$= \text{Cos}2x\text{Cos}4x + 2\text{Cos}2x\text{Sin}2x\text{Sin}2x$

$= \text{Cos}2x\text{Cos}4x + \text{Sin}4x\text{Sin}2x$

$= \text{Cos}\,(4x-2x)$

$= \text{Cos}2x$

<u>Formulas Used in the above lines are</u>

<u>$\text{Cos}\,(A+B) = \text{Cos}A\text{Cos}B - \text{Sin}A\text{Sin}B$</u>

<u>$\text{Sin}2A = 2\text{Sin}A\text{Cos}A$</u>

<u>$\text{Cos}2A = 2\,\text{Cos}^2 A - 1$</u>

Wave y_1 can be written as

$y_1 = 2\text{Cos}^2 x + \frac{\sqrt{3}-1}{2}$

$= (\text{Cos}\,2x + 1) + \frac{\sqrt{3}-1}{2}$

On adding both the waves we get $2\text{Cos}2x + \frac{\sqrt{3}+1}{2}$

It is maximum when $x = 0$;

So maximum amplitude is $\frac{5+\sqrt{3}}{2}$

b)

$y_2 = a\,\{3\text{Sin}\omega t\,(\text{Cos}\omega t\text{Cos}\phi) - 3\text{Sin}\omega t\,(\text{Sin}\omega t\text{Sin}\phi) - 4\text{Sin}^3 x\,(\text{Cos}\omega t\text{Cos}\phi) + 4\text{Sin}^3\omega t\,(\text{Sin}\omega t\text{Cos}\phi) + \text{Cos}3\omega t\text{Sin}(\omega t+\phi)\}$

It can be written as

a [(3Sinωt - 4Sin^{3}x)(CosωtCosϕ – SinωtSinϕ) + Cos3ωtSin(ωt+ϕ)]
It is same as a[Sin3ωtCos(ωt+ϕ) + Cos3ωtSin(ωt+ϕ)]
Which is aSin(4ωt + ϕ)

On adding it with the other wave we get

Y = a (Sin (4ωt+ϕ) + Sin4ωt)

=a (2Sin ($\frac{8\omega t+\varphi}{2}$) Cos ($\frac{\varphi}{2}$))

=2a Cos ($\frac{\varphi}{2}$) (Sin ($\frac{8\omega t+\varphi}{2}$))

29)

a) Change in Potential energy of spring = work done

As the spring extends by length y, change in potential energy of spring is $\frac{1}{2}ky^2$

Small work done in moving the conductor by a distance dy is

dw = Fdy

$=\frac{\mu}{2\pi y} I_a I_b L\ dy$

Net work = $\frac{\mu}{2\pi} I_a I_b L \int \frac{dy}{y}$

$=\frac{\mu}{2\pi} I_a I_b L \log y$

$\frac{1}{2}ky^2 = \frac{\mu}{2\pi} I_a I_b L \log y$

$K = \frac{\mu}{2\pi} I_a I_b L \log y.\ Y^{-1}$

b) Magnetic field due to a current carrying conductor of infinite length is $\frac{\mu I}{2\pi r}$.

Magnetic field at a point (x, y, z) due to a current carrying conductor along x-axis is given by

$B_x = \frac{\mu I}{2\pi\sqrt{(y^2+z^2)}}$, $B_y = \frac{\mu I}{2\pi\sqrt{(X^2+Z^2)}}$ and $B_z = \frac{\mu I}{2\pi\sqrt{(y^2+x^2)}}$

Net magnetic field is $((B_x + B_y)^2 + (B_z)^2)^{1/2}$

$$= \frac{\mu I}{2\pi} \left\{ \frac{1}{Y^2+Z^2} + \frac{1}{X^2+Z^2} + \frac{1}{Y^2+X^2} + \frac{2}{\sqrt{\{(Y^2+Z^2)(X^2+Y^2)\}}} \right\}^{1/2}$$

c) Meissner effect – The phenomenon of perfect diamagnetism in superconductors.

d) 1) Platinum is paramagnetic and Gold is diamagnetic.

2) It has no unit.