BK BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
SENIOR SECONDARY CO-ED DAY CUM BOYS' RESIDENTIAL SCHOOL

PRE BOARD - 1 EXAMINATION 2023-24

PHYSICS (042)

Class : XII — Duration: 3 Hrs
Date : 15/12/2023 — Max. Marks: 70

ANSWER KEY

Section A

1. (b) the electric field is zero.

2. (c) q/8ε0

3. (a) 5.16 x 1014 Hz

4. (d) The electron will continue to move with uniform velocity along the axis of the solenoid.

5. (d) All of the above

6. (b) Diamagnetic materials

7. (b) 2.5 × 10-4 T along SN direction

8. (d) inversely proportional to n3

9. (c) X/4

10. (a) 1.8×10^8 ms^{-1}

11. (d) 5 V

12. (b) n = 3 to n = 1

13. (c)

14. (b)

15. (a)

16. (a)

Section B

17. (a) Under reverse biased condition, the p-type semiconductor is connected to the negative terminal of battery whereas; the n-type semiconductor is connected to the positive terminal of battery.

(b)

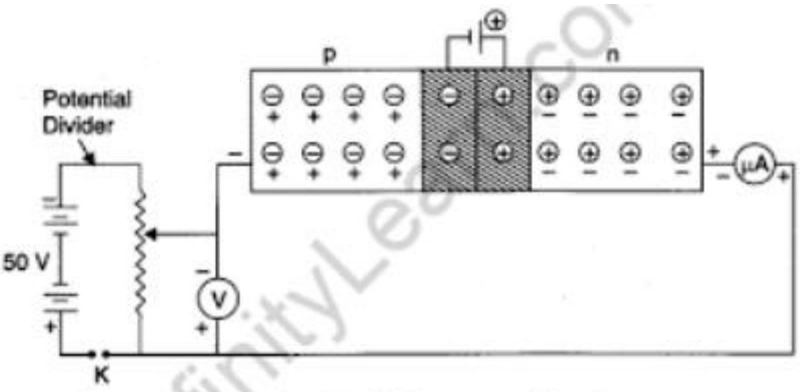


Fig. p-n junction diode—reverse biased.

18. Temperature, $T_1 = 27.5°C$
Resistance of the silver wire at T_1, $R_1 = 2.1\ \Omega$
Temperature, $T_2 = 100°C$
Resistance of the silver wire at T_2, $R_2 = 2.7\ \Omega$
Temperature coefficient of silver = α
It is related with temperature and resistance as

$$\alpha = \frac{R_2 - R_1}{R_1(T_2 - T_1)}$$
$$= \frac{2.7 - 2.1}{2.1(100 - 27.5)} = 0.0039\ °C^{-1}$$

Therefore, the temperature coefficient of silver is $0.0039°C^{-1}$.

19. Angle of minimum deviation δm and angle of prism A are related as, Glass prism of refractive index 1.5 is immersed in a liquid of refractive index 1.3 so the relative refractive index of the prism decreases μ' = 1.5/1.3 = 1.115 So as per above equation as A is constant for a prism, as μ decreases, δm also decreases.

20. de Broglie wave length

$$\lambda = \frac{h}{\sqrt{2mE}} = \frac{h}{\sqrt{2mqV}}$$

For α-particle, $\lambda_\alpha = \frac{h}{\sqrt{2m_\alpha q_\alpha V}}$

For proton, $\lambda_p = \frac{h}{\sqrt{2m_p q_p V}}$

$\therefore \quad \frac{\lambda_\alpha}{\lambda_p} = \sqrt{\frac{m_p q_p}{m_\alpha q_\alpha}}$

But $\frac{m_\alpha}{m_p} = 4, \frac{q_\alpha}{q_p} = 2$

$\therefore \quad \frac{\lambda_\alpha}{\lambda_p} = \sqrt{\frac{1}{4} \cdot \frac{1}{2}} = \frac{1}{2\sqrt{2}}$

21.

Focal length of the convex lens, f = 20 cm
Image distance = v
According to the lens formula, we have the relation:

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

$$\frac{1}{v} - \frac{1}{12} = \frac{1}{20}$$

$$\frac{1}{v} = \frac{1}{20} + \frac{1}{12} = \frac{3+5}{60} = \frac{8}{60}$$

$$\therefore v = \frac{60}{8} = 7.5 \text{ cm}$$

Hence, the image is formed 7.5 cm away from the lens, toward its right.

OR

fo= 144cm; fe=6cm
For a telescope, the magnification is given as: m=fo/fe
m=144/6=24
The separation between the objective lens and the eyepiece is given by: d=fo+fe =150cm

Section C

22. $_{26}Fe^{56}$ nucleus contains 26 protons .

Number of neutrons =(56−26)=30 neutrons.

Now,

Mass of 26 protons=26 X 1.007825=26.20345u

Mass of 30 neutrons=30 X 1.008665=30.25995u

Total mass of 56 nucleons=56.46340u

Mass of $_{26}Fe^{56}$ nucleus=55.934939u

Therefore,

Mass defect, △m =56.46340−55.934939=0.528461u

Total Binding Energy=0.528461 X 931.5Mev=492.26MeV

Average binding energy per nucleon=492.2656=8.790MeV

23. Dipole moment of the system, $p=q\times dl=-10^{-7}$Cm

Rate of increase of electric field per unit length,

$dE/dl=10^{+5}NC^{-1}$

Force (F) experienced by the system is given by the relation,

F=qE

F= q(dE/dl)×dl =p×(dE/dl) = $-10^{-7}\times10^{-5}$ $=-10^{-2}$N

The force is -10^{-2}N in the negative z-direction i.e., opposite to the direction of electric field.
Hence, the angle between electric field and dipole moment is 180°.

Torque (τ) is given by the relation,

T=pEsin180°=0

Therefore, the torque experienced by the system is zero.

24. It is given that the energy of the electron beam used to bombard gaseous hydrogen at room temperature is 12.5 eV. Also, the energy of the gaseous hydrogen in its ground state at room temperature is −13.6 eV.

When gaseous hydrogen is bombarded with an electron beam, the energy of the gaseous hydrogen becomes −13.6+12.5 eV i.e., −1.1 eV.

Orbital energy is related to orbit level (n) as: $E=-13.6/(n^2)$eV

For n=3,E=−13.69=−1.5eV

This energy is approximately equal to the energy of gaseous hydrogen. It can be concluded that the electron has jumped from n=1 to n=3 level. During its de-excitation, the electrons can jump from n=3 to n=1 directly, which forms a line of the Lyman series of the hydrogen spectrum. We have the relation for wave number for Lyman series as:

$1/\lambda=Ry(1/1^2-1/n^2)$

Where, Ry=Rydberg constant $=1.097\times10^7m^{-1}$

λ= Wavelength of radiation emitted by the transition of the electron

For n=3, we can obtain λ as:

$1/\lambda=1.097\times10^7(1/1^2-1/3^2)=1.097\times10^7\times8/9$

$\Rightarrow\lambda=9/(8\times1.097\times10^{7)}=102.55$nm

If the electron jumps from n=2 to n=1, then the wavelength of the radiation is given as:

$1/\lambda=1.097\times10^7(1/1^2-1/2^2)=1.097\times10^7\times3/4$

$\Rightarrow \lambda = 4/(3 \times 1.097 \times 10^7) = 121.54nm$

If the electron jumps from n=3 to n=2 then the wavelength of the radiation is given as:

$1\lambda = 1.097 \times 107(1/2^2 - 1/3^2) = 1.097 \times 10^7 \times 5/46$

$\Rightarrow \lambda = 46/(5 \times 1.097 \times 10^7) = 653.33nm$

This radiation corresponds to the Balmer series of the hydrogen spectrum. Hence, in Lyman series, two wavelengths i.e., 102.5 nm and 121.5nm are emitted. And in the Balmer series, one wavelength i.e., 656.33 nm is emitted.

25. Here, area of the loop, A =12 x 12 =144 cm^2 =144 x 10^{-4} m^2; V =8 cm s^{-1} =8 x 10^{-2}m s^{-1} ; R = 4.5 m Ω = 4.5 x 10^{-3} Ω

$$\frac{dB}{dx} = -10^{-3} \text{ T cm}^{-1} = -0.1T_m^{-1};$$

$$\frac{dB}{dt} = 10^{-3} \text{ T}_s^{-1}$$

The induced e.m.f. produced due to space variation of magnetic field,

$$e_1 = \frac{d\phi}{dt} = \frac{d}{dt}[B.A] = \frac{-dB}{dt} \times A = \frac{-dB}{dx} \times \frac{dx}{dt} \times A$$

$$= -\frac{dB}{dx} \times V \times A = -[-0.1 \times 8 \times 10^{-2} \times 144 \times 10^{-4}]$$

$$= 11.52 \times 10^{-5} \text{ V}$$

The induced e.m.f produced due to space variation of magnetic field.

$$e_2 = \frac{-d\phi}{dt} = \frac{-d}{dt}[B.A] = -\frac{dB}{dt} \times A$$

$$= -[-10^{-3} \times 144 \times 10^{-4}] = 1.44 \times 10^{-5} \text{ V}$$

Therefore, total induced e.m.f. produced in the loop,

$$e = e_1 + e_2 = 11.52 \times 10^{-5} \times 1.44 \times 10^{-5}$$

$$= 12.96 \times 10^{-5} \text{ V}$$

Therefore, induced current produced in the loop,

$$I = \frac{e}{R} = \frac{12.96 \times 10^{-5}}{4.5 \times 10^{-3}} = 2.88 \times 10^{-2} \text{ A}$$

According to Lenz's law, the induced current flows through the loop in a direction so as to cause an increase in the magnetic flux along the positive Z-direction. To an observer, the current will appear to be flowing in anti clock-wise direction, if the loop is moving towards right.

26. If the current through a coil is altered then the flux through that coil also changes, and this will induce an e.m.f. in the coil itself. This effect is known self-induction and the property of the coil is the self-inductance (L) of the coil, usually abbreviated as the inductance. The self-inductance can be defined in two ways: (a) NF=LI or (b) Using the

equation for the e.m.f. generated: $E = - L(dI/dt)$
The induced emf is also called back emf . Self-induction is also call inertia of electricity.
Self induction of long solenoid of inductance L

A long solenoid is one which length is very large as compared to its cross section area. the magnetic field inside such a solenoid is constant at any point and given by
$B=\mu 0NI/l$
$\mu 0$=absolute magnetic permeability N=total number of turns
Magnetic flux through each turn of solenoid
$\phi=B\times$area of each turn $\phi=\mu 0NI/l \times A$ total flux =flux ×total number of turns
$N\phi=N(\mu 0NI/l\times A)$..........(1)
If L is the coefficient of inductance of solenoid
$N\phi=LI$..............(2)
from equation 1 and 2
$LI=N(\mu 0NI/l\times A)L=\mu 0N^2Al$ …………….(3)
The magnitude of emf is given by
$|e|$or $e=LdI/dt$..............(4)
multiplying I to both sides eI dt=L Idt but I=dq/dt Idt=dq
Also work done (dW)= voltage X Charge(dq)
or dW = eXdq = eIdt
substituting the values in equation 4
dW = LIdt
By integrating both sides
$\int dW=\int LIdtW=(1/2)LI_0^2$
this work done is in increasing the current flow through inductor is stored as potential energy (U) in the magnetic field of inductor.
$U=(1/2)LI_0^2$

OR

Principle: It is based on the principle of mutual inductance and transforms the alternating low voltage to alternating high voltage and in this the number of turns in secondary coil is more than that in primary coil. (i. e.,NS > Np).

Working: When alternating current source is connected to the ends of primary coil, the current changes continuously in the primary coil; due to which the magnetic flux linked with the secondary coil changes continuously, therefore the alternating emf of same frequency is developed across the secondary.

Let Np be the number of turns in primary coil, NS the number of turns in secondary coil and f the magnetic flux linked with each turn. We assume that there is no leakage of flux so that the flux linked with each turn of primary coil and secondary coil is the same. According to Faraday's laws the emf induced in the primary coil

$$\varepsilon_p = -N_p \frac{\Delta\phi}{\Delta t} \quad ...(i)$$

and emf induced in the secondary coil

$$\varepsilon_S = -N_S \frac{\Delta\phi}{\Delta t} \quad ...(ii)$$

From (*i*) and (*ii*)

$$\frac{\varepsilon_S}{\varepsilon_p} = \frac{N_S}{N_p} \quad ...(iii)$$

If the resistance of primary coil is negligible, the emf (εp) induced in the primary coil, will be equal to the applied potential difference (Vp) across its ends. Similarly if the secondary circuit is open, then the potential difference VS across its ends will be equal to the emf (εS) induced in it; therefore

$$\frac{V_S}{V_p} = \frac{\varepsilon_S}{\varepsilon_p} = \frac{N_S}{N_p} = r \text{ (say)} \quad ...(iv)$$

where r = N_S/Np is called the transformation ratio. If ip and i_S are the instantaneous currents in primary and secondary coils and there is no loss of energy; then For about 100% efficiency, Power in primary = Power in secondary

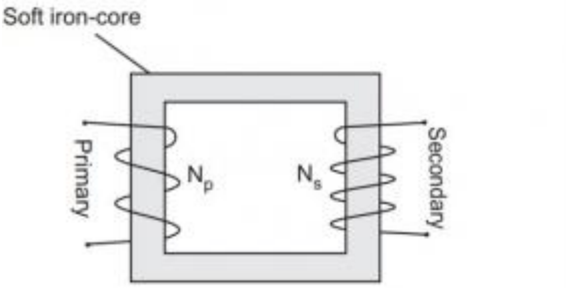
$$V_p i_p = V_S i_S$$

$$\therefore \quad \frac{i_S}{i_p} = \frac{V_p}{V_S} = \frac{N_p}{N_S} = \frac{1}{r} \quad ...(v)$$

In step up transformer, $N_s > N_p \rightarrow r > 1$;

So $V_S > V_p$ and $i_S < i_p$

i.e., step up transformer increases the voltage.



Two coils on separate limbs of the core

27. a. Microwaves are suitable for radar systems that are used in aircraft navigation.
These rays are produced by special vacuum tubes, namely Klystrons, magnetrons and Gunn diodes.
b. Infrared waves are used to treat muscular strain.
These rays are produced by hot bodies and molecules.

c. X rays are used as a diagnostic tool in medicine.
These rays are produced when high energy electrons are stopped suddenly on a metal of high atomic number.

28. Let I_1 be the current flowing through the outer circuit.
Let I_2 be the current flowing through AB branch.
Let I_3 be the current flowing through AD branch.
Let $I_2 - I_4$ be the current flowing through branch BC.
Let $I_3 + I_4$ be the current flowing through branch DC.
Let us take closed-circuit ABDA into consideration, we know that potential is zero.
i.e , $10 I_2 + 5 I_4 - 5 I_3 = 0$
$2 I_2 + I_4 - I_3 = 0$
$I_3 = 2 I_2 + I_4$ . . . . (1) Let us take closed circuit BCDB into consideration, we know that potential is zero.
$5 (I_2 - I_4) - 10 (I_3 + I_4) - 5 I_4 = 0$
$5 I_2 - 5 I_4 - 10 I_3 - 10 I_4 - 5 I_4 = 0$
$5 I_2 - 10 I_3 - 20 I_4 = 0$
$I_2 = 2 I_3 - 4 I_4$ . . . . (2)
Let us take closed-circuit ABCFEA into consideration, we know that potential is zero. i.e , $- 10 + 10 (I_1) + 10 (I_2) + 5 (I_2 - I_4) = 0$
$10 = 15 I_2 + 10 I_1 - 5 I_4$
$3 I_2 + 2 I_2 - I_4 = 2$ . . . . (3)
From equation (1) and (2), we have :
$I_3 = 2(2 I_3 + 4 I_4) + I_4$
$I_3 = 4 I_3 + 8 I_4 + I_4$
$- 3 I_3 = 9 I_4$
$- 3 I_4 = + I_3$ . . . . (4)
Putting equation (4) in equation (1) , we have :
$I_3 = 2 I_2 + I_4$
$- 4 I_4 = 2 I_2$
$I_2 = - 2 I_4$ . . . . (5)
From the above equation , we infer that :
$I_1 = I_3 + I_2$ . . . .(6)
Putting equation (4) in equation (1), we obtain
$3 I_2 + 2 (I_3 + I_2) - I_4 = 2$
$5 I_2 + 2 I_3 - I_4 = 2$ . . . . (7)
Putting equations (4) and (5) in equation (7), we obtain
$5 (- 2 I_4) + 2 (- 3 I_4) - I_4 = 2$
$- 10 I_4 - 6 I_4 - I_4 = 2$
$17 I_4 = - 2$
$I_4 = - 2/17 A$
$I_3 = - 3 (I_4) = 6/17 A$

I_2= 4/17A
I_1= 10/17 A
In branch AB 4/17A
In branch BC 6/17 A,
In branch CD -4/17A,
In branch AD 6/17A,
In branch BD -2/17 A
Total Current 10/17 A

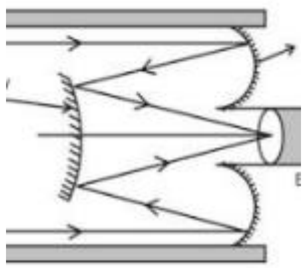
Section C

29. (a)The objective lens of a microscope is the one at the bottom near the sample. At its simplest, it is a very high-powered magnifying glass, with very short focal length. This is brought very close to the specimen being examined so that the light from the specimen comes to a focus inside the microscope tube.

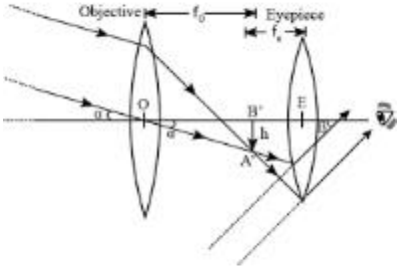
(b) $L = f_o + f_e$.

(c)1. Mirrors can be made bigger than lenses in size.
2. No chromatic aberration.
3.In case parabolic mirror is used, then no spherical aberration.
4. Some light gets blocked inside the refracting telescope, but not reflecting telescope. (ANY TWO)

(d)

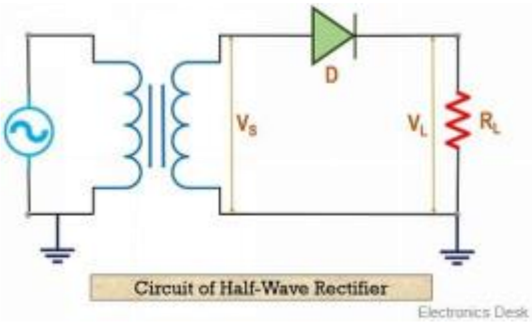


OR



30. (a) In case of LED forward bias mode means higher energy level electrons are falling to lower energy level thereby releasing energy in form of visible light.

(b)



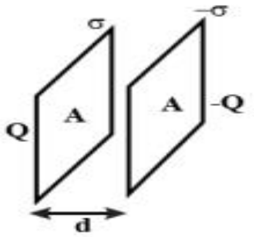
(c)The depletion layer of a diode is substantially thinner in forward bias and decreases a diode's resistance.

(d) 50 Hz

OR

100 Hz

31. (a)



$$c = \frac{q}{v} = \frac{q}{\frac{qd}{\epsilon_0 A}}$$

$$= \frac{q \cdot \epsilon_0 A}{qd} = \frac{\epsilon_0 A}{d}$$

$$\therefore \boxed{C = \frac{\epsilon_0 A}{d}} \quad \ldots\text{(iii)}$$

(b) Area of each plate $A=6\times10^{-3}m^2$

Distance between the plates d=3mm=0.003m

Capacitance of capacitor $C=A\epsilon_0/d$

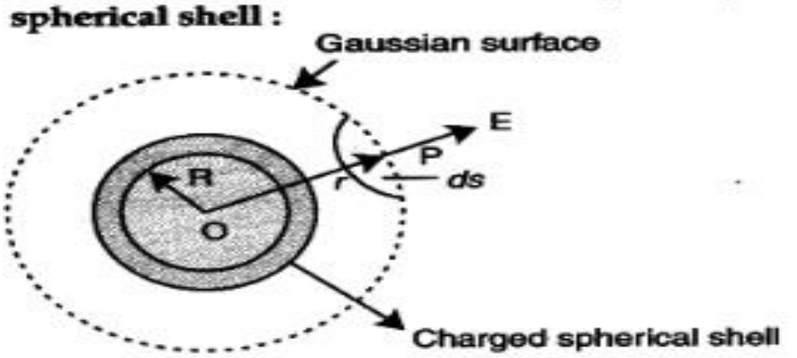
$\therefore C=6\times10^{-3}\times8.85\times10^{-12}/0.003=17.7pF$

When the space between them is filled with a substance of dielectric constant 6, the capacitance = 17.7 pF X 6= 106.2 pF.

OR

(a)

Electric field due to a uniformly charged thin spherical shell :



When point P lies outside the spherical shell : Suppose that we have to calculate electric field at the point P at a distance r (r > R) from its centre. Draw the Gaussian surface through point P so as to enclose the charged spherical shell. The Gaussian surface is a spherical shell of radius r and centre O. 1

Let $\vec{E}$ be the electric field at point P, then the electric flux through area element is $\vec{dS}$ given by,

$$\Delta\phi = \vec{E}\cdot\vec{\Delta S}$$

Since $\vec{\Delta S}$ is also along normal to the surface,

$$\Delta\phi = E.\,dS$$

∴ Total electric flux through the Gaussian surface is given by.

$$\phi = \oint_s E dS = E\oint_s dS$$

$$\therefore \qquad \phi = E \times 4\pi r^2 \qquad \ldots(i)$$

Since the charge enclosed by the Gaussian surface is q, according to the Gauss's theorem,

$$\phi = \frac{q}{\varepsilon_0} \qquad \ldots(ii)$$

From equations (i) and (ii), we obtain

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

$$E = \frac{1}{4\pi\varepsilon_0}\cdot\frac{q}{r^2} \qquad (\text{for } r > R)$$ **1**

(ii) When point P lies inside the spherical shell : In such a case, the Gaussian surface encloses no charge. According to the Gauss's law,

$$E \times 4\pi r^2 = 0$$

i.e., $E = 0\ (r < R)$

A graph showing the variation of electric field as a function of r is shown below.

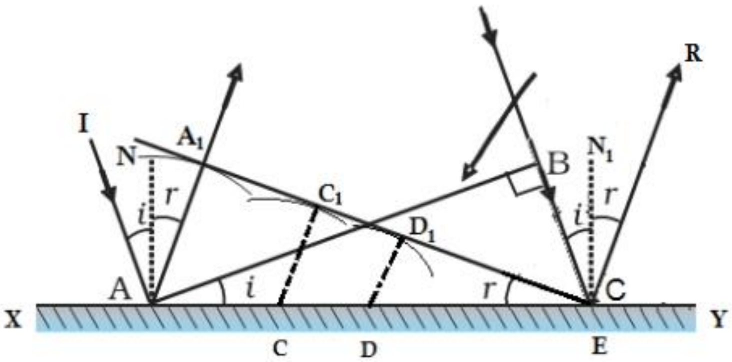
Electric field intensity (E) at a distance (d) from the centre of a sphere containing net charge q is given by the relation,

$$E = \frac{1}{4\pi\varepsilon_0} \cdot \frac{q}{d^2}$$

Where, q = Net charge = 1.5 × 10^3 N/C d = Distance from the centre = 20 cm = 0.2 m εo = Permittivity of free space and $1/4\pi\varepsilon o = 9\times10^9\ Nm^2C^{-2}$

Therefore, $q=E(4\pi\varepsilon o)d^2=1.5\times10^3$ X 0.04 /9×10^9 = 6.67 × 10^{-9} C = 6.67 nC Therefore, the net charge on the sphere is 6.67 nC.

32. (a)



In the given figure, AB is the wavefront incident on a reflecting surface XY with an angle of incidence i as shown in figure. According to Huygen's principle, every point on AB acts as a source of secondary wavelets. At first, wave incidents at point A and then to points C, D and E. They form a sphere of radii AA1, CC1 and DD1 as shown in figure.

A1E represents the tangential envelope of the secondary wavelet in forward direction.

In ΔABE and ΔAA1E, ∠ABE = ∠AA1E = 90°

Side AE = Side AE, AA1 = BE = distance travelled by wave in same time

So, these triangles are congruent.

So, ∠BAE = i and ∠BEA =r

Thus, i = r

(b) The wavelength of the light is λ1=650nm. The wavelength of second light,λ_2=520nm. Distance between the slit and the screen is 1.2m.

Distance between the slits is 2 mm.

(i) The relation between the nth bright fringe and the width of fringe is:

$x=n\lambda_1 D/d$

For third bright fringe, n=3

$x=3\times650$ X10^{-9} X 1.2/ (2×10^{-3}) = $1950\times6\times10^3$nm

$x=11.7\times10^{-3}$m =11.7mm

(ii) We can consider that nth bright fringe of λ2 and the (n−1) th bright fringe of wavelength λ1 coincide with each other.

$n\lambda_2 = (n-1)\lambda_1$

520n=650n−650 Or 650=130n Or n=5

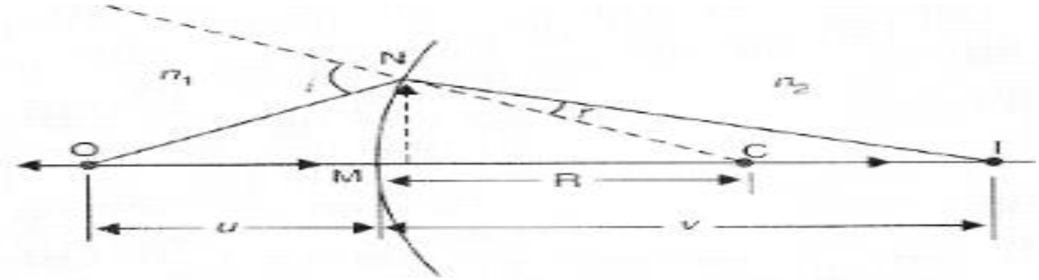
Therefore, the least distance from the central maximum can be obtained as:

$x' = n\lambda_2 D/d$ Or $x' = 5 \times 520 D/d = 2600 \times 1.2 / 2 \times 10^{-3}$ nm

$x' = 1.56 \times 10^{-3}$ m = 1.56 mm

OR

(a)



From the given diagram, for small angles :

$$\tan \angle NOM = \frac{MN}{OM} = \angle NOM$$

$$\tan \angle NCM = \frac{MN}{MC} = \angle NCM$$

$$\tan \angle NIM = \frac{MN}{MI} = \angle NIM$$

For Δ NOC, $\angle i$ is the exterior angle.

$$\Rightarrow \angle i = \angle NOM + \angle NCM$$

$$= \frac{MN}{OM} + \frac{MN}{MC}$$

Similarly,

$$\Rightarrow \angle r = \angle NCM + \angle NIM$$

$$r = \frac{MN}{MC} + \frac{MN}{MI}$$

$$n_1 \sin i = n_2 \sin r$$

$$n_1 i = n_2 r$$

$$\Rightarrow n_1 \left(\frac{MN}{OM} + \frac{MN}{MC} \right) = n_2 \left(\frac{MN}{MC} - \frac{MN}{MI} \right)$$

$(n_2/v) - (n_1/v) = (n_2 - n_1)/R$

(b) Lens maker's formula,

1f=(μ−1)(1/R1−1/R2)

Here, f = 20 cm, μ = 1.55, R1 = R, R2 = -R

120=(1.55−1)(1/R−1/(−R)) or 120 = 0.55×2R

⇒R=1.1×20=22cm

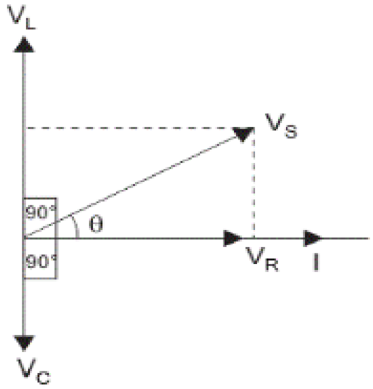
33.

(a) Impedance of the RLC circuit as seen in the phasor diagram, can be found as

Z=VI =√(IR)^2+I^2(XL−XC)^{2}I

=√R^2+($X_L - X_C$)^2

$=\sqrt{R^2+(\omega L-1/\omega C)^2}$



(b) Inductance of the inductor, L = 0.50 H Resistance of the resistor, R = 100 Ω Potential of the supply voltage, V = 240 V Frequency of the supply, ν = 50 Hz

(i) Peak voltage is given as:

$$V_0=\sqrt{2}V$$
$$=\sqrt{2}\times 240=339.41\ \text{V}$$

Angular frequency of the supply, ω = 2 πν = 2π × 50 = 100 π rad/s Maximum current in the circuit is given as:

$$I_0=\frac{V_0}{\sqrt{R^2+\omega^2L^2}}$$
$$=\frac{339.41}{\sqrt{(100)^2+(100\pi)^2(0.50)^2}}=1.82\ \text{A}$$

Hence, the time lag between maximum voltage and maximum current is

$$\tan\phi=\frac{\omega L}{R}$$
$$=\frac{2\pi\times 50\times 0.5}{100}=1.57$$
$$\phi=57.5^\circ=\frac{57.5\pi}{180}\ \text{rad}$$
$$\omega t=\frac{57.5\pi}{180}$$
$$t=\frac{57.5}{180\times 2\pi\times 50}$$
$$=3.19\times 10^{-3}\text{s}$$
$$=3.2\ \text{ms}$$

Now, phase angle Φ is given by the relation, Hence, the time lag between maximum voltage and maximum current is 3.2 ms.

OR

(a) According to Faraday's law of electromagnetic induction the magnitude of induced EMF is equal to the rate of change of magnetic flux linked with the closed circuit or coil. Mathematically

E=−NdϕBdt

where N is the number of terms in the circuit and ϕB is the magnetic flux linked with each turn.

Supposed a conducting rod completes one revolution in time t then :

Change in flux =B × Area= $B\times\pi l^2$

Induced Emf = Change in flux /Time

$\varepsilon=B\times\pi l^2$ T Or T=2πω ∴ $\varepsilon=B\times\pi l^2/ 2\pi\omega= (1/2)\ Bl^2\omega$

(b) Length of the rectangular wire, l=8cm=0.08m

Width of the rectangular wire, b=2cm=0.02m

Hence, area of the rectangular loop,

$A=lb=0.08\times0.02=16\times10^{-4}m^2$

Magnetic field strength, B=0.3T

Velocity of the loop, v=1cm/s=0.01m/s

(i)Emf developed in the loop is given as:

$e=Blv=0.3\times0.08\times0.01=2.4\times10^{-4}V$

Time taken to travel along the width, t= Distance travelled / Velocity=b/v

=0.02/0.01=2s

Hence, the induced voltage is $2.4\times10^{-4}V$ which lasts for 2 s.

(ii)

Emf developed, $e=Bbv=0.3\times0.02\times0.01=0.6\times10^{-4}V$

Time taken to travel along the length, t=Distance travelled /Velocity=l/v

=0.08/0.01=8s

Hence, the induced voltage is $0.6\times10^{-4}V$ which lasts for 8 s. -

-------------------------ALL THE BEST------------------------------