Solution |CBSE-XII |Test No-08 | Vidyarthi & Shiksha

Pre-Board Examination : 2025-26

Sub : Physics

(The figures in the margin indicate full marks for the questions)

Time – 3 hours **Full marks-70**

Section A (Each question carries 1 mark)	
1	The distance of closest approach of an alpha particle is d when it moves with a speed v towards a nucleus. Another alpha particle is projected with higher energy such that the new distance of the closest approach is d/4. The speed of projection of the alpha particle in changed situation is- (A) V /2 (B) √2 V (C) 2 V (D) 4 V
Ans	$d = \frac{const}{V_1^2} \ldots .(1)$ $\frac{d}{4} = \frac{const}{V_2^2} \ldots(2)$ From equations (1) and (2) $4 = \frac{V_2^2}{V_1^2} \Rightarrow V_2 = 2\ V_1$ $\therefore\ V_2 = 2\ V$ Given, $(V_1 = V)$
2	A point object is placed at the centre of a glass sphere of radius 8 cm and refractive index 1.5.The distance of virtual image from the surface of the sphere is- (A) 2 cm (B) 4cm (C) 8 cm (D) 12 cm

Ans	$u = -6cm, v = ?, r = -6cm, \mu_1 = 1, \mu_2 = 1.5$ Using the formula of spherical refracting surface, $\frac{\mu_2}{v} - \frac{\mu_1}{u} = \frac{\mu_2 - \mu_1}{R}$ We have $\frac{1.5}{v} - \frac{1}{-6} = \frac{1.5-1}{-6} \Rightarrow v = -6cm$
3	Colours observed on a CD (Compact Disk is due to (A) Reflection (B) Diffraction (C) Dispersion (D) Absorption
Ans	(B) Diffraction
4	In a series LCR circuit, the voltage across the resistance, capacitance and inductance is 10 V each. If current flowing in the circuit is 1A. The impedance of the circuit will be - (A) 10Ω (B) 10√2 Ω (C) 10/√2 Ω (D) 20 Ω
Ans	$X_C = X_L = R$ V = $\sqrt{V_R^2 + (V_L - V_C)^2}$ but $V_L = V_C$ $\therefore V = V_R = 10$ When capacitor is short circuited, $V_C = 0$ and $V_R = V_L$ $\therefore V = \sqrt{V_R^2 + V_L^2}$ or $10 = \sqrt{2}V_L$ $\therefore V_L = \frac{10}{\sqrt{2}}V.$
5	An electric dipole having charge of +2 C and -2C of

	length 2 cm is placed inside a spherical face of radius 5 cm. The flux linked through the surface is - (A) $2/\varepsilon_0$ (B) $4/\varepsilon_0$ (C) 0 (D) None of these
Ans	$$\Phi = \frac{Q_{enc}}{\varepsilon_0}$$ $$Q_{enc} = +2\mu C + (-2\mu C) = 0$$ $$\Phi = \frac{0}{\varepsilon_0} = 0$$
6	Magnetic field at the centre of current crying semi-circular coil is- (A) $\mu_o ni/4R$ (B) $\mu_o ni/8R$ (C) $\mu_o ni/2R$ (D) 0
Ans	(A) $\mu_o ni/4R$
7	Any wire whose resistance is 4 ohms is bent in form of a circular loop, then what will be the resistance between any two points located diametrically opposite to each other. (A) 2Ω (B) 4Ω (C) 1Ω (D) None of these
Ans	$$R_{half} = \frac{R}{2} = \frac{4\,\Omega}{2} = 2\,\Omega$$ Use the formula for two resistors in parallel is given by: $$\frac{1}{R_{effective}} = \frac{1}{R_1} + \frac{1}{R_2}$$ $$\frac{1}{R_{effective}} = \frac{1}{2} + \frac{1}{2} = \frac{2}{2} = 1$$ $$R_{effective} = 1\,\Omega$$
8	The diffraction effect can be observed in - (A) Sound waves only

	(B) light waves only (C) Ultrasonic waves only (D) sound waves as well as light waves
Ans	Ans - (D) sound waves as well as light waves
9	If the threshold wavelength of photo electric effect for sodium metal is 5000 A°. Then its work function is : (A) 15J (B) $4X10^{-19}$ J (B) (C) $4X10^{-14}$ J (D) None of these
Ans	$W_0 = \frac{hc}{\lambda_0} = \frac{6.63\times10^{-34}\times3\times10^8}{5000\times10^{-10}} = 4\times10^{-19}$ J
10	Ratio of Mass number of two elements is 64:27, then ratio of radius of their nuclei will be (A) 3:4 (B) 2:3 (C) 3:2 (D) 4:3
Ans	Ans - (D) 4:3
11	Average voltage of 50 V is produced when current in a coil changes from 5 A to 2 A in 0.1 s. The coil's self-inductance is- (A) 1.67 H (B) 1H (C) 6H (D) 0.67H
Ans	According to Faraday's law of electromagnetic induction, Induced emf, e = Ldi / dt $\Rightarrow 50 = L\left(\frac{5-2}{0.1\text{sec}}\right)$ $\Rightarrow L = \frac{50\times0.1}{3} = \frac{5}{3} = 1.67$ H
12	The mobility of free electrons is greater than that of holes as- (A) they are light (B) they mutually collide less c) they require low energy to continue the motion

	(D) they carry negative energy
Ans	Ans -(D) they carry negative energy
13	**(a) If both Assertion and Reason are true and Reason is correct explanation of Assertion.** **(b) If both Assertion and Reason are true but Reason is not the correct of Assertion.** **(c) If Assertion is true but Reason is false.** **(d) If both Assertion and Reason are false.** Assertion (A): Increasing the current sensitivity of a galvanometer by increasing the number of turns may not necessarily increase its voltage sensitivity. Reason(R): The resistance of the coil of the galvanometer increases on increasing the number of turns.
Ans	Ans-(A)
14	Assertion (A):The capacitive reactance limits the amplitude of the current in a purely capacitive circuit Reason (R) : Capacitive reactance is proportional to the frequency and the capacitance.
Ans	Ans-(C)
15	Assertion (A): de Broglie's wavelength of a freely falling body keeps decreasing with time. Reason (R): The momentum of the freely falling body increases with time.
Ans	Ans-(A)
16	Assertion (A) : The diffusion current in a p-n junction is from the p-side to the n-side.. Reason (R) :The diffusion current in a p-n junction is

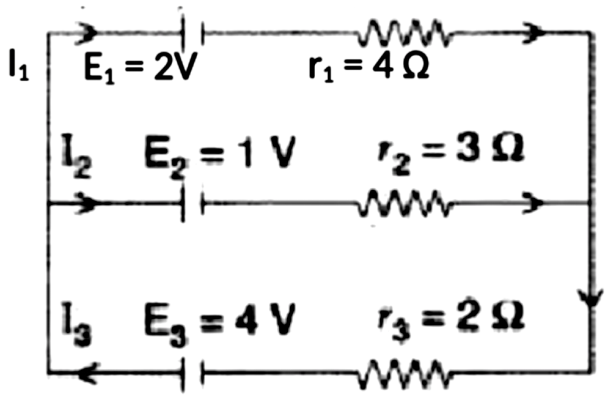
	greater than the drift current when the junction is in forward biased.
Ans	Ans-(C)
Section B (Each question carries 2 marks)	
17	Laser light of wavelength 640 nm incident on a pair of slits produces an interference pattern in which the bright fringes are separated by 7.2 mm. Calculate the wavelength of another source of light which produces interference fringes separated by 8.1 mm using same arrangement.
Ans	$\beta = \frac{\lambda D}{d}$ $\beta \propto \lambda$ $\frac{\beta_1}{\beta_2} = \frac{\lambda_1}{\lambda_2}$ **Given:** $\beta_1 = 7.2$ mm, $\beta_2 = 8.1$ mm, $\lambda_1 = 600$ nm, $\lambda_2 = ?$ $\lambda_2 = \frac{\lambda_1 \beta_2}{\beta_1} = \frac{600 \times 8.1}{7.2}$ **= 675 nm** $\boldsymbol{\lambda_2 = 675}$ **nm**
	OR In Young's double-slit experiment using monochromatic light of wavelength λ, the intensities of two sources are I. What is the intensity of light at a point where path difference between wave fronts is λ/4?
Ans	The resultant intensity I_{res} at a point in Young's double-slit experiment, where the individual source intensities are I, is given by $I_{\text{res}} = 4I\cos^2\left(\frac{\phi}{2}\right)$

	Substituting the calculated phase difference $\phi = \pi/2$ $I_{\text{res}} = 4I\cos^2\left(\frac{\pi/2}{2}\right) = 4I\cos^2\left(\frac{\pi}{4}\right)$ Since $\cos(\pi/4) = 1/\sqrt{2}$, $\cos^2(\pi/4) = 1/2$ $I_{\text{res}} = 4I\left(\frac{1}{2}\right) = 2I$ The phase difference ϕ between the two waves is related to the path difference Δx by the formula: $\phi = \frac{2\pi}{\lambda}\Delta x$ Substituting the given path difference $\Delta x = \lambda/4$: $\phi = \frac{2\pi}{\lambda}\left(\frac{\lambda}{4}\right) = \frac{\pi}{2}$
18	A coil having 500 square loops each of side 10 cm is placed normal to a magnetic field which increases at the rate of 1Tesla/Sec. What will be the induced emf ?
Ans	The side length of a square loop is $L = 10\text{ cm} = 0.1\text{ m}$ The area A of a single loop is $A = L^2 = (0.1\,\text{m})^2 = 0.01\,\text{m}^2$ $\mathscr{E} = N\frac{d\Phi_B}{dt} = NA\frac{dB}{dt}$ $N = 500$ loops, $A = 0.01\text{ m}^2$, and $\frac{dB}{dt} = 1\text{ T/s}$ $\mathscr{E} = 500 \times 0.01\text{ m}^2 \times 1\text{ T/s} = 5\text{ V}$ $\mathscr{E} = 5\text{ V}$
19	State the principle of full wave rectifier with

	necessary circuit diagram.
20	Two circular loops A and B, each of radius 3 m, are placed coaxially at the distance of 4 m. They carry current of 3 A and 2A in opposite directions respectively. Find the net magnetic field at the centre of loop A.
Ans	The magnetic field at the center of a circular current-carrying loop is given by the formula $$B = \frac{\mu_0 I}{2R}$$ For loop A: $$B_A = \frac{\mu_0 I_A}{2R} = \frac{4\pi \times 10^{-7} \times 3}{2 \times 3} = 2\pi \times 10^{-7}\mathrm{T}$$ Using the right-hand rule, if we assume the current direction produces a field to the right, this is the direction of B_A

	The magnetic field along the axis of a circular loop at a distance d from its center is $B = \frac{\mu_0 I R^2}{2(R^2 + d^2)^{3/2}}$ For loop B at the center of loop A $B_B = \frac{\mu_0 I_B R^2}{2(R^2 + d^2)^{3/2}} = \frac{4\pi \times 10^{-7} \times 2 \times 3^2}{2 \times (3^2 + 4^2)^{3/2}}$ $= \frac{72\pi \times 10^{-7}}{2 \times (9 + 16)^{3/2}}$ $= \frac{72\pi \times 10^{-7}}{2 \times (25)^{3/2}}$ $= \frac{72\pi \times 10^{-7}}{2 \times 125}$ $B_B \approx 0.288\pi \times 10^{-7}\text{T} \approx 9.04 \times 10^{-8}\text{T}$ Since the current in loop B is in the opposite direction to that in loop A, $B_{net} = B_A - B_B = (2\pi \times 10^{-7}) - (0.288\pi \times 10^{-7})$ $B_{net} \approx 5.378 \times 10^{-7}\text{T}$ The direction of the net field is the same as the direction of the stronger field, B_A
21	A platinum surface having work function 5.63 eV is illuminated by a monochromatic source of 1.6 x 10^{15} Hz. What will be the minimum wavelength associated with the ejected electron.

Ans	Given $\phi_0 = 5.63eV = 5.63 = 5.63 \times 1.6 \times 10^{-19} J$ $v = 1.6 \times 10^{15} Hz$ $K.E = hv - \phi_0 = \frac{hc}{\lambda}$ $\lambda = \frac{hc}{hv - \phi_0} = \frac{6.63 \times 10^{-34} \times 3 \times 10^{8}}{6.63 \times 10^{-34} \times 1.6 \times 10^{15} - 5.63 \times 1.6 \times 10^{-19}}$ $= 12.4 \times 10^{-7}\, m$
Section C (Each question carries 3 marks)	
22	An inductor L of inductance X, is connected in series with a bulb B and an ac source. How would brightness of the bulb change when in turn (i) number of turns in the inductor is reduced, (ii) an iron rod is inserted in the inductor and (iii) a capacitor of reactance $X_C = X_L$ is inserted in series in the circuit. Justify your Answer in each case.
Ans	**Answer:** The brightness of the bulb changes as follows: **(i) Number of turns reduced:** The brightness **increases** because inductance (L) decreases, reducing inductive reactance ($\mathbf{X_L}$) and thus total circuit impedance ($\mathbf{Z}$), allowing more current to flow. **(ii) Iron rod inserted:** The brightness **decreases** because the iron rod increases the inductance (L) due to higher magnetic permeability, increasing $\mathbf{X_L}$ and thus $\mathbf{Z}$, which reduces the current. **(iii) Capacitor with $\mathbf{X_C = X_L}$ inserted:** The brightness **increases significantly** because this condition creates resonance, where the inductive and capacitive reactances cancel each other out, making the total impedance equal only to the resistance ($\mathbf{Z = R}$) and allowing maximum current to flow.
23	Find the expression for the capacitance of a parallel plate capacitor of plate area A and plate separation d when (I) a dielectric slab of thickness t and (II) a

	metallic slab of thickness t, where (t < d) are introduced in turn between the plates of the capacitor.In which case would the capacitance be more and why?
24	Using the mathematical expression for the conductivity of a material, explain how it varies with temperature for (i) semiconductors (ii) conductors (iii) Electrolytes
25	Draw a plot of the binding energy per nucleon as a function of mass number for a large number of nuclei, $1 \leq A \leq 240$. How do you explain the constancy of binding energy per nucleon in the range $30 < A < 170$ using the property that nuclear force is short-ranged?
26	State Kirchhoff's rules. Use these rules to calculate the current I_1 ,I_2 and I_3 in the circuit diagram shown. 

Ans	From Kirchhoff's first law $I_3 = I_1 + I_2$ ...(i) For applying Kirchhoff's second law to mesh ABDC $-2 - 4I_1 + 3I_2 + 1 = 0 \Rightarrow 4I_1 - 3I_2 = -1$ ...(ii) Applying Kirchoff's II law to mesh ABCEA $-2 - 4I_1 - 2I_3 + 4 = 0 \Rightarrow 4I_1 + 2I_3 = 2$ or $2I_1 + I_3 = 1$ Using (i) we get $\Rightarrow 2I_1 + (I_1 + I_2) = 1$ or $3I_1 + I_2 = 1$...(iii) Solving (ii) and (iii), we get $I_1 = \frac{2}{3}$ A, $I_2 = 1 - 3I_1 = \frac{7}{13}$ A So, $2I_3 = I_1 + I_2 = \frac{9}{13}$ A
27	Write down Bohr's postulates of the atomic model, using these postulates derive the expression for radius of n^{th} electron orbit. Hence obtain the expression for Bohr's radius. OR (i)Show that the radius of the orbit in hydrogen atom varies as n^2, where n is the principal quantum number of the atom. ii) When an electron in hydrogen atom jumps from the third excited state to the ground state low would the de Broglie wavelength associated with the electron change?

Ans	$\lambda = \frac{h}{p} \quad p = mv$ $E = \frac{1}{2}mv^2 = \frac{p^2}{2m}$ $\therefore p = \sqrt{2mE}$ $\frac{\lambda_1}{\lambda_2} = \frac{p_2}{p_1} = \sqrt{\frac{E_2}{E_1}}$ Now $E_n = \frac{13.6}{n^2}$ $\therefore E \propto \frac{1}{n^2}$ For third excited state "n" = 4. So, ratio of wavelength of ground state (n = 1) to 3rd excited state (n = 4) is $\frac{\lambda_2}{\lambda_1} = \sqrt{\frac{E_1}{E_2}} = \sqrt{\frac{1}{16}} = \frac{1}{4}$
28	Write the two processes that take place in the formation of a p-n junction. Explain with the help of a diagram, the formation of depletion region and barrier potential in a p-n junction .
	Section D
29	<u>**Read the following paragraph & answer the questions follow**</u> All the known radiations from a big family of electromagnetic waves which stretch over a large range of wavelengths. Electromagnetic wave

	includes radio waves, microwaves, visible light waves, infrared rays, UV rays, X-rays and gamma rays. The orderly distribution of the electromagnetic waves in accordance with their wavelength or frequency into distinct groups having widely differing properties is electromagnetic spectrum. (i) Which wavelength of the Sun is used finally as electric energy? (a) radio waves (b) infrared waves (c) visible light (d) microwaves **Ans- (c) visible light** ii) Which of the following electromagnetic radiations have the longest wavelength? (a) X-rays (c) microwaves (b) gamma rays (d) radio waves **Ans- (d) radio waves** (iii) Which one of the following is not electromagnetic in nature? (a) X-rays (b) gamma rays (c) cathode rays (d) infrared rays **Ans- (c) cathode rays**. (iv) Which of the following has minimum wavelength?

	(a) X-rays (c) gamma rays (b) ultraviolet rays (d) cosmic rays **Ans -(c) gamma rays**. OR (The decreasing order of wavelength of infrared, microwave, ultraviolet and gamma rays is (a) microwave, infrared, ultraviolet, gamma rays (b) gamma rays, ultraviolet, infrared, microwave (c) microwave, gamma rays, infrared, ultraviolet **(d)** infrared, microwave, ultraviolet, gamma rays **Ans- microwave (longest), infrared, ultraviolet, and gamma rays (shortest).**
30	**Read the following paragraph & answer the questions follow.** Huygens principle is the basis of wave theory of light. Each point on a wavefront acts as a fresh source of new disturbance, called secondary waves or wavelets. The secondary wavelets spread out in all directions with the speed light in the given medium. An initially parallel cylindrical beam travels in a medium of refractive index $\mu(I) = U_o + U_2 I$, where U_o and U_2 are positive constants and I is the intensity of the light beam. The intensity of the beam is decreasing with increasing radius. (i). The initial shape of the wave front of the beam is (a) planar

	(b) convex (c) concave (d) convex near the axis and concave near the periphery **Ans- (a) planer** (ii) According to Huygens Principle, the surface of constant phase is (a) called an optical ray (b) called a wave (c) called a wave front (d) always linear in shape **Ans- (c)** (iii). As the beam enters the medium, it will (a) travel as a cylindrical beam (b) diverge (c) converge (d) diverge near the axis and converge near the periphery **Ans - (c)** (iv) The characteristic of wave that remain unchanged after reflection or refraction is (a) speed (b) frequency (c) wavelength (d) momentum **Ans- (b)** OR The wave front of beam of parallel light is

	(a) Spherical (b) Plane (c) cylindrical (d) None **Ans- (b)**
Section E	
31	(i) Deduce Lens maker's formula. (ii) A convex lens has focal length 10 cm in air and refractive index of the lens material is 1.5.What will be the effect on power and nature of the lens if it is immersed in a liquid whose refractive index is (i) 1.33 (ii) 1.66 . Justify your answer in each case. $$\frac{1}{f} = \left(\frac{n_{\text{lens}}}{n_{\text{medium}}} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$ In air ($n_{\text{air}} \approx 1.0$), the focal length f_{air} is 10 cm. We can find the constant curvature term $C = \left(\frac{1}{R_1} - \frac{1}{R_2}\right)$ $$\frac{1}{f_{\text{air}}} = \left(\frac{n_{\text{lens}}}{n_{\text{air}}} - 1\right) C$$ $$\frac{1}{10\text{ cm}} = \left(\frac{1.5}{1.0} - 1\right) C$$ $$C = \frac{1}{10 \times 0.5}\ \text{cm}^{-1} = \mathbf{0.2}\ \text{cm}^{-1}$$ When immersed in the first liquid, $(n_{\text{liquid}} = 1.33)$

$$\frac{1}{f_1} = \left(\frac{1.5}{1.33} - 1\right)C \quad = (1.1278 - 1) \times 0.2\ \text{cm}^{-1}$$

$$f_1 \approx +\mathbf{39.12}\ \text{cm}$$

$$P_1 = \frac{1}{0.3912\ \text{m}} \approx +\mathbf{2.56}\ \text{D}$$

The focal length is positive, so the lens remains a **convex (converging)** lens,

When immersed in the second liquid, $(n_{\text{liquid}} = 1.66)$

$$\frac{1}{f_2} = \left(\frac{1.5}{1.66} - 1\right)C \quad = (0.9036 - 1) \times 0.2\ \text{cm}^{-1}$$

$$f_2 \approx -\mathbf{51.88}\ \text{cm}$$

The power is $P_2 = 1/f_2(\text{m})$ $P_2 = \frac{1}{-0.5188\ \text{m}} \approx -\mathbf{1.93}\ \text{D}$

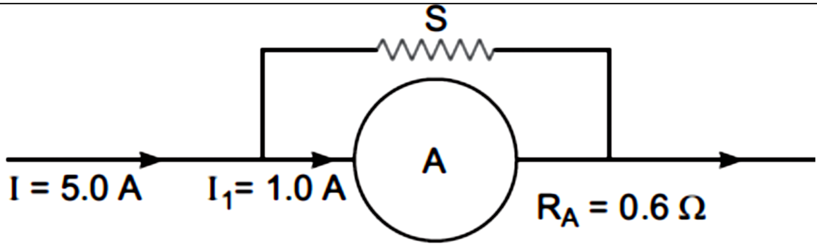
The focal length is negative, so the lens changes its nature to a **concave (diverging)**

OR

(i)Draw a ray diagram to show the formation of the image of an object placed on the axis of a vex refracting surface of radius of curvature 'R', separating the two media of refractive indices n_1 and n_2 ($n_2 > n_1$). Use this diagram to deduce the relation $n_2/v - n_1/u = (n_2 - n_1)/R$, where u and v represent respectively the distance of the object and the image formed.

(ii) The radii of curvature of the faces of a double convex lens are 10 cm and 15 cm. If focal length of the lens is 12 cm, find the refractive index of the

	material of the lens Given R_1 =10cm, R_2 = -15cm, f =12cm Refractive index n =? Lens-maker's formula is $\frac{1}{f}=(n-1)\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$ $\Rightarrow \frac{1}{12}=(n-1)\left(\frac{1}{10}+\frac{1}{15}\right) =(n-1)\times\frac{5}{30}$ $\Rightarrow n-1=\frac{30}{5}\times\frac{1}{12}$ or $n=1+\frac{30}{60}$ $\Rightarrow n=1+0\cdot5=1\cdot5$
32	(i) State the underlying principle of working of a moving coil galvanometer. Write two reasons why a galvanometer cannot be used as such to measure current in a given circuit. Name any two factors on which the current sensitivity of a galvanometer depends. (ii) An ammeter of resistance 0.6 Ω can measure current upto 1.0 A. Calculate (a) The shunt resistance required to enable the ammeter to measure current upto 5.0 A (b) The combined resistance of the ammeter and the shunt.



(i) From Ohm's law $I_1 R_A = (I - I_1)S$

$$1.0 \times 0.6 = (5 - 1) \times S$$

$$\Rightarrow \quad S = \frac{0.6}{4} = 0.15\,\Omega$$

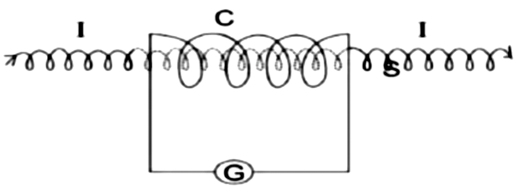
$$(ii) \text{ Combined resistance } R_{eq} = \frac{R_A S}{R_A + S}$$

$$\Rightarrow R_{eq} = \frac{0.6 \times 0.15}{0.6 + 0.15} = \frac{0.09}{0.75} = \frac{3}{25} = 0.12\,\Omega$$

OR

(i) Using Ampere's circuital law, obtain an expression for the magnetic field along the axis of a current carrying solenoid of length l and having N number of turns.

(ii) A current-carrying solenoid S of radius r with 100 turns per unit length is placed coaxially side a coil C of 100 turns and twice the radius of the solenoid as shown.



Current I through the solenoid S changes from 2 A in one direction to 2 A in the opposite direction within

	an interval of 2 seconds. (i) What is the rate of change in current that occurs in the solenoid? (ii) Calculate the rate of change in flux experienced by coil C due to a change in current in solenoid S in terms of radius r of solenoid S. (i) Rate of change in current, $\Delta I/\Delta t = 4/2 = 2$ A/s (ii) Let n be the number of turns per unit length of coil S and N be the number of turns for coil C. Flux through S $\Phi_S = BA = (\mu_o nI)(\pi r^2)$ Rate of change in flux linked to coil C, $\Delta\Phi_C/\Delta t = N.\Delta\Phi_S/\Delta t = N\,\mu_o n\pi r^2.\Delta I/\Delta t$ $= 100 \times 4\pi \times 10^{-7} \times 100 \times \pi \times r^2 \times 2$ $= 8\pi^2 r^2 \times 10^{-3}$
33	(a) State and prove Gauss law of electrostatics and apply it to find the electric field intensity at any point due to spherical conducting shell. (b) A spherical Gaussian surface encloses a positive charge q. Explain with a reason what happens to the net electric flux through the Gaussian surface if: (i) the charge is tripled (ii) the volume of the sphere is tripled (iii) the shape of the Gaussian surface is changed into a cuboid the charge is moved into another location inside the Gaussian surface

Ans-

(i) The net flux is also tripled because as per Gauss law the net flux is proportional to the net charge enclosed.

(ii) Regardless of the volume of the enclosed surface, if the net charge enclosed is the same, the net flux remains the same as per Gauss law.

(iii) No change in the net flux as it doesn't depend upon the shape of the closed surface. As long as the new location of the charge remains inside the Gaussian surface, there is no change in net flux.

OR

(a) Define electric flux and write its SI unit.

(b) Use Gauss's law to obtain the expression for the electric field due to a uniformly charged infinite plane sheet of charge.

(c) A charge q is placed at the centre of a cube of side L. What is the electric flux passing through each face of the cube?

By Gauss's Theorem in electrostatics

$$\phi = \int \vec{E} \cdot \vec{ds} = \frac{q}{\varepsilon_0}$$

Total flux through all six faces would be $\phi' = 6\phi$

where ϕ = Flux through one face.

Hence, $$6\phi = \frac{q}{\varepsilon_0} \Rightarrow \phi = \frac{q}{6\varepsilon_0}$$