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	Electric potential on the surface of a metallic conductor is 7 Volt. Electric potential inside the conductor is (A)14V (B) 7V (C) ZERO (D) data insufficient
Ans	7 V , this is because, in electrostatic equilibrium, the net electric field everywhere inside a metallic conductor is zero. Consequently, the electric potential must be constant throughout the entire volume of the conductor and equal to the potential maintained on its surface.
2	A radio can tune any station in the 7.5MHz to 12 MHz What is the responding wavelength band? (A)80m -25 m (B)40m – 25m (C)20m – 10m (D)10m-25m
Ans	The relationship between the speed of light c, frequency f, and wavelength λ is given by the formula: $\lambda = \frac{c}{f}$ Where $c = 3 \times 10^8$ m/s

	The relationship between the speed of light c, frequency f, and wavelength λ is given by $\lambda = \frac{c}{f}$ Where $c = 3 \times 10^8$ m/s. The frequencies in Megahertz (MHz), $$\lambda = \frac{300}{f\ (\text{in MHz})}$$ For the lower frequency $f_1 = 7.5$ MHz: $$\lambda_1 = \frac{300}{7.5} = 40 \text{ m}$$ For the upper frequency $f_2 = 12$ MHz: $$\lambda_2 = \frac{300}{12} = 25 \text{ m}$$ The corresponding wavelength band for the radio tuning range of 7.5 MHz to 12 MHz is **40m – 25m**
3	According to Einstein's photoelectric equation, the plot of the kinetic energy of the emitted photo electrons from a metal versus the frequency of the incident radiation gives a straight line whose slope (A)Is the same for all metals and independent of the intensity of the radiation (B)Depends on the intensity of the radiation (C)Depends both on the intensity of the radiation and the metal used (D)Depends on the nature of the metals used
Ans	Ans-(A)
4	A proton and an alpha particle are having same

	velocity. the ratio of their De Broglie wave length is (A)1:2 (B) 2:1 (C)1:4 (D) 4:1
Ans	De Broglie's wavelength is given as $\lambda=h/mv$ Since mass of alpha particle is four times mass of proton and they are having same velocity , $\lambda \propto \frac{1}{m} \Rightarrow \frac{\lambda_p}{\lambda_a} = \frac{m_a}{m_p} = \frac{4m}{m} = \frac{4}{1}$
5	Colors observed on a CD (Compact Disk) is due to Reflection (B) Diffraction (C) Dispersion (D) Absorption
Ans	Ans -B
6	A silver wire has a resistance of 2.1 Ω at 27.5 °C, and a resistance of 2.7 Ω at 100°C. What is the temperature coefficient of resistivity of silver? (A)0.0059 (B) 0.0039 (C) 0.0129 (D) 0.0159
Ans	Initial resistance at $T_1 = 27.5$ °C: $R_1 = 2.1\ \Omega$ Final resistance at $T_2 = 100$ °C: $R_2 = 2.7\ \Omega$ Change in temperature: $\Delta T = T_2 - T_1$ $= 100\ °C - 27.5\ °C = 72.5\ °C$ The temperature coefficient (α) is given : $\alpha = \frac{R_2 - R_1}{R_1(T_2 - T_1)}$ $\alpha = \frac{2.7 - 2.1}{2.1(72.5)} = \frac{0.6}{152.25}$ $\alpha \approx 0.0039408...\ °C^{-1}$

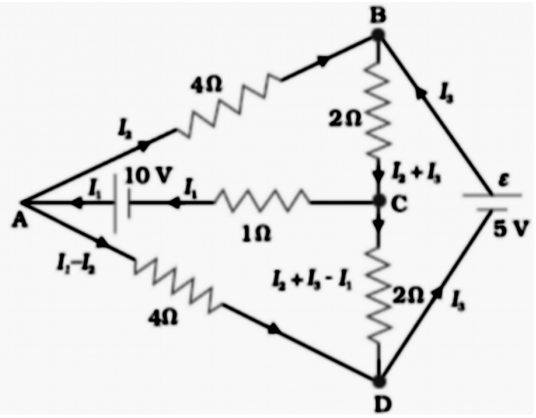
7	Give the number of electrons passing through a wire per minute. The current flowing through it is 500mA. (A)1.875×10^{20} (B)6.875×10^{20} (C)1.875×10^{-20} (D)6.875×10^{-20}
Ans	The total charge (Q) passing through the wire is the product of the current and the time interval: $Q = I \times t = 0.5\ \text{A} \times 60\ \text{s} = 30\ \text{C}$ $n = \frac{Q}{e} = \frac{30}{1.6 \times 10^{-19}} = 18.75 \times 10^{19} = 1.875 \times 10^{20}$
8	A point object is placed at the centre of a glass sphere of radius 6 cm and refractive index 1.5. The distance of virtual image from the surface of the sphere is (A) 2cm (B) 4cm (C)6cm (D)12cm
Ans	Refractive index of the first medium (glass): $\mu_1 = 1.5$ Refractive index of the second medium (air): $\mu_2 = 1.0$ Object distance (at the center): $u = -6$ cm Radius of curvature: $R = -6$ cm The formula for refraction at a single spherical surface is: $\frac{\mu_2}{v} - \frac{\mu_1}{u} = \frac{\mu_2 - \mu_1}{R} \Rightarrow \frac{1.0}{v} - \frac{1.5}{-6} = \frac{1.0 - 1.5}{-6}$ $\Rightarrow v = -6$ cm
9	A Compound microscope uses an objective lens of focal length 4 cm and eyepiece lens of focal length 10 cm. An object is placed at 6 cm from the objective lens. The magnifying power of the compound microscope if final image is formed at infinity is

	(A)6 (B) 10 (C) 12 (D) 5
Ans	The total magnifying power (M) of the compound microscope is the product of the magnifications of the objective and the eyepiece: $M = m_o \times m_e = m_o \times m_e = \mid \frac{v_o}{u_o} \mid \times \frac{D}{f_e}$ $M = \mid \frac{12}{-6} \mid \times \frac{25}{10} = 2 \times 2.5 = 5$
10	During Faraday's electromagnetic induction experiment the mechanical efforts of movement of magnet near a coil produces electrical energy within the coil. This phenomenon can be best explained on the basis of: (A) Lenz's law and conservation of energy (B) Lenz's law and conservation of charge (C) Faraday's law and conservation of energy (D) None of the above
Ans	(A) Lenz's law and conservation of energy
11	Two thin lenses of power +4D and -2D are placed in contact focal length of the combination is (A)10cm (B) 50cm (C) 40cm (D) 2cm
Ans	When two thin lenses are placed in contact, the equivalent power P of the combination is the algebraic sum of their individual powers $P_1$and P_2 Given P1= + 4D and P_2=-2D $P = P_1 + P_2 \Rightarrow P = 4 + (-2) = 2D$ The focal length of the combination is $f = \frac{1}{P} = \frac{1}{2} = 0.5m = 50$ cm
12	The mass number of two nuclei are in the ratio 27:125.

	The ratio of their nuclear radii is . (A)1:1 (B) 3:4 (C) 5:3 (D) 3:5
Ans	$\frac{R_1}{R_2} = \frac{R_0 A_1^{1/3}}{R_0 A_2^{1/3}} = \left(\frac{A_1}{A_2}\right)^{1/3} = \left(\frac{27}{125}\right)^{1/3} = \frac{3}{5}$
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): When two coils are wound on each other, the mutual induction between coil is maximum Reason(R) -- Mutual induction doesn't depends on the orientation of the coils
Ans	Ans-(C)
14	Assertion (A): On 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)
15	Reason (R): The momentum of the freely falling body increases with time. Assertion (A): de Broglie's wavelength of a freely falling body keeps decreasing with time.
Ans	Ans-A
16	Assertion (A) : No interference pattern is detected when two coherent sources are infinitely close to each other. Reason (R) : The fringe width is inversely proportional to the

	distance between the two slits.
Ans	Ans-A
Section B (Each question carries 2 marks)	
17	Identify the following part of electromagnetic spectrum and arrange them as per descending order of their wavelength. (a) Produced by Klystron valve (b)Used in Remote control (b) Widely used in medical science (d) Absorbed by ozone layer
Ans	○ (a) Microwaves: Produced by specialized vacuum tubes like Klystron and magnetron valves. ○ (b) Infrared rays: Used in remote controls for devices like televisions. ○ (c) X-rays: Widely used in medical science as a diagnostic tool for imaging internal body structures. ○ (d) Ultraviolet (UV) rays: Effectively absorbed by the ozone layer in the atmosphere, protecting the Earth from harmful solar radiation. Descending Order of Wavelength In the electromagnetic spectrum, wavelength decreases as frequency increases. The correct descending order (longest to shortest wavelength) for these parts is: 1. Microwaves (Produced by Klystron valve) 2. Infrared rays (Used in remote control) 3. Ultraviolet rays (Absorbed by ozone layer) 4. X-rays (Widely used in medical science) ®
18	Derive the relation between drift velocity V_d of electrons and current I flowing in a conductor having area of cross section A.

19	A 0.5m long solenoid of 10 turns/cm has area of cross-section 1cm^2. Calculate the voltage induced across its ends if the current in the solenoid is changed from 1A to 2A in 0.1 sec.
Ans	$n = 10 \text{ turns /cm} = 10 \times 10^{+2} \text{ turns/ m}$ $a = 1 \text{ cm}^2 = 10^{-4} \text{ m}^2 \qquad l = 0.5\text{m}$ $\frac{di}{dt} = \frac{2-1}{0.1} = \frac{1}{0.1} = 10\text{A/s}$ $\varepsilon = -L\frac{di}{dt} = \mu_0 n^2 Al \frac{di}{dt}$ $= 4\pi \times 10^{-7} \times (10^{+3})^2 \times 10^{-4} \times 0.5 \times 10$ $= 4\pi \times 10^{-7} \times 10^6 \times 10^{-4} \times 5 \times 10^{-1} \times 10$ $\varepsilon = 20\pi \times 10^{-5} \text{ V}$
20	Draw a graph showing the variation of stopping potential with frequency of incident radiation in relation to photoelectric effect. Deduce an expression for the slope of graph using Einstein's photo electric equation. OR Write Einstein's photo electric equation Using this equation find out what changes will occur in the following quantities if the frequency of incident radiation on a photocell is doubled for the same intensity, (i) kinetic energy of photo electrons emitted (ii) photoelectric current (iii) Work Function
21	Draw the energy band diagram for N-type and P-type semiconductor at (i) T=0 K and (ii) room temperature.
Section C (Each question carries 3 marks)	
22	If a nucleus $_{26}Fe^{56}$ splits into two nuclei of $_{13}Al^{28}$, would

	the energy be released or needed for this purpose to occur? Given mass($_{26}$ Fe^{56}) = 55.934944 u & mass($_{13}$Al^{28}) = 27.98191u, 1u = 931MeV/c2 . Calculate the energy in MeV
Ans	$^{56}_{26}$ Fe nucleus is most stable ; therefore, energy will be needed for the reaction to occur. The reaction is $m\ (^{56}_{26}Fe) + Q \rightarrow 2\ (^{28}_{13}Al)$ Difference of mass = 2 × (27.98191) u – 55.93494 u = 0.02888 u Energy needed, Q = 0.02888 × 931 MeV = 26.88728 MeV
23	Find the expression for the capacitance of a parallel plate capacitor of plate area A and plate separation d when a dielectric slab of thickness t (t < d) is introduced between the plates of the capacitor. What is capacitance if, metal slab of same thickness is used?
24	Using Kirchhoff's laws find out the value of current I_1, I_2 and I_3. 

Ans	Kirchhoff's 2nd rule for the closed loop ADCA gives, $10 - 4(I_1 - I_2) + 2(I_2 + I_3 - I_1) - I_1 = 0$ $\Rightarrow 7I_1 - 6I_2 - 2I_3 = 10$ .....(i) For the closed loop ABCA, we get $10 - 4I_2 - 2(I_2 + I_3) - I_1 = 0$ $\Rightarrow I_1 + 6I_2 + 2I_3 = 10$ .....(ii) For the closed loop BCDEB, we get $5 - 2(I_2 + I_3) - 2(I_2 + I_3 - I_1) = 0$ $\Rightarrow 2I_1 - 4I_2 - 4I_3 = -5$ .....(iii) Solving equations (i), (ii) and (iii), $I_1 = 2.5A$, $I_2 = 5/8$ A, $I_3 = 15/8$ A
25	A plane wavefront (AB) is incident on a refracting surface XY. Using Huygen's principle verify the laws of refraction if the rays incident from denser medium.
26	State Bohr's postulate for the permitted orbits for the electron in a hydrogen atom. Use this postulate to prove that the circumference of the nth permitted orbit for the electron can contain exactly 'n' wavelengths of the de-Broglie wavelength associated with the electron in that orbit.
Ans	Bohr's postulate for permitted orbits states that electrons in a hydrogen atom revolve around the nucleus only in specific circular orbits, known as stationary or non-radiating orbits. In these orbits, the angular momentum (L) of the electron is quantized, meaning it is an integral multiple of $h/2\pi$.

$$mvr = \frac{nh}{2\pi} \quad \text{..... (1)}$$

where n is known as the principal number and can take any integral value 1, 2, 3, ……. and h is Planck's constant.

Since a hydrogen atom has only one electron, according to Bohr's postulate, the angular momentum of that electron is given by:

$$mvr = n\frac{h}{2\pi} \quad \text{....(1)} \quad \text{Where, } n = 1, 2, 3, \ldots$$

According to de Broglie's equation:

$$\lambda = \frac{h}{mv} \Rightarrow mv = \left(\frac{h}{\lambda}\right) \quad \text{....(2)}$$

Substituting the value of 'mv' from expression (2) in expression (1):

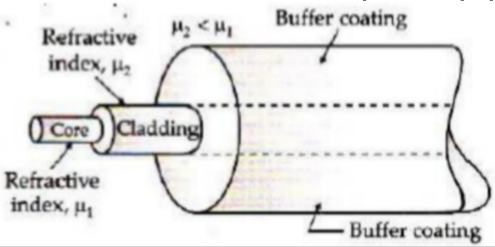
$$\frac{hr}{\lambda} = n\frac{h}{2\pi} \Rightarrow 2\pi r = n\lambda \quad \text{.....(3)}$$

Hence it is proved that the circumference of the nth permitted orbit for the electron can contain exactly 'n' wavelengths of the de-Broglie wavelength associated with the electron in that orbit.

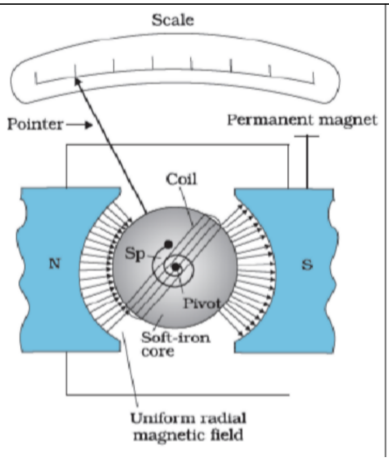
OR

Find out longest and shortest wave length of Balmer series of Hydrogen spectrum. In which region of electromagnetic spectrum does it belongs?

	For shortest wavelength in Balmer series $n_f = 2, n_1 = \infty$ $\frac{1}{\lambda} = R\left[\frac{1}{n_f^2} - \frac{1}{n_i^2}\right] \Rightarrow \frac{1}{\lambda} = R\left[\frac{1}{4}\right] = \frac{R}{4}$ $\Rightarrow \lambda = \frac{4}{1.097\times10^7} m = 3.646 \times 10^{-7} m = 3646\ Å$ For longest wavelength in Balmer series $n_f = 2, n_1 = 3$ $\frac{1}{\lambda} = R\left[\frac{1}{n_f^2} - \frac{1}{n_i^2}\right] \Rightarrow \frac{1}{\lambda} = R\left[\frac{1}{4} - \frac{1}{9}\right] = \frac{5}{36}R$ $\Rightarrow \lambda = \frac{36}{5\times1.097\times10^7} m = 6.563\times10^{-7} m = 6563\ Å$ It belongs to the visible part of the electromagnetic spectrum
27	In a two slit experiment with monochromatic light, fringes are obtained on a screen placed at some distance D from the slits. if the screen is moved 5 X 10^{-2} m towards the slits, the change in fringe width is 3 X 10^{-5} m. if the distance between the slits is 10^{-3} m, calculate the wavelength of the light used.
Ans	$\beta = \frac{\lambda D}{d}$ $\Delta\beta = \frac{\lambda}{d}\Delta D$ $\lambda = \frac{\Delta\beta.d}{\Delta D} = \frac{3\times10^{-5}\times1\times10^{-3}}{5\times10^{-2}} = 600\times10^{-9} m$
28	Differentiate between Para , Ferro and Dia magnetic substances in respect of following parameters

	i) Behaviour in presence of external magnetic field ii) Relative magnetic permeability iii) Effect of temperature Also write one example each of Para, Ferro and Dia magnetic substances
	Section D
29	**Read the following paragraph & answer the questions follow** Optical fibers: Now-a-days optical fibers are extensively used for transmitting audio and video signals through long distances. Optical fibers too make use of the phenomenon of total internal reflection. Optical fibers are fabricated with high quality composite glass/quartz fibers. Each fiber consists of a core and cladding. The refractive index of the material of the core is higher than that of the cladding. When a signal in the form of light is directed at one end of the fiber at a suitable angle, it undergoes repeated total internal reflections along the length of the fiber and finally comes out at the other end. Since light undergoes total internal reflection at each stage, there is no appreciable loss in the intensity of the light signal. Optical fibers are fabricated such that light reflected at one side of inner surface strikes the other at an angle larger than the critical angle. Even if the fiber is bent, light can easily travel along its length. Thus, an optical fiber can be used to act as an optical pipe. 

	(i) Which of the following statement is not true. (A) Optical fibers is based on the principle of total internal reflection. (B) The refractive index of the material of the core is less than that of the cladding. (C) An optical fiber can be used to act as an optical pipe. (D) There is no appreciable loss in the intensity of the light signal while propagating through an optical fiber. (ii) What is the condition for total internal reflection to occur? (A) angle of incidence must be equal to the critical angle. (B) angle of incidence must be less than the critical angle. (C) angle of incidence must be greater than the critical angle. (D) None of the above. (iii) Which of the following is not an application of total internal reflection? (A) Mirage (B) Sparkling of diamond (C) Splitting of white light through a prism. (D) Totally reflecting prism (iv) Optical fibers are used extensively to transmit (A) Optical Signal (B) current (C) Sound waves (D) None of the above
Ans	(i)(B) The refractive index of the material of the core is less than that of the cladding. (ii)(C) angle of incidence must be greater than the critical angle. (iii)(C) Splitting of white light through a prism. (iv)(A) Optical Signal
30	**Read the following paragraph & answer the questions follow.**



The galvanometer is a device used to detect the current flowing in a circuit or a small potential difference applied to it. It consists of a coil with many turns, free to rotate about a fixed axis, in a uniform radial magnetic field formed by using concave pole pieces of a magnet. When a current flows through the coil, a torque acts on it.

(i) What is the principle of moving coil galvanometer?

(A) Torque acting on a current carrying coil placed in a uniform magnetic field.

(B) Torque acting on a current carrying coil placed in a non-uniform magnetic field.

(C) Potential difference developed in the current carrying coil.

(D) None of these.

(ii) If the field is radial, then the angle between magnetic moment of galvanometer coil and the magnetic field

(A) 0° (B) 30° (C) 60° (D)90°

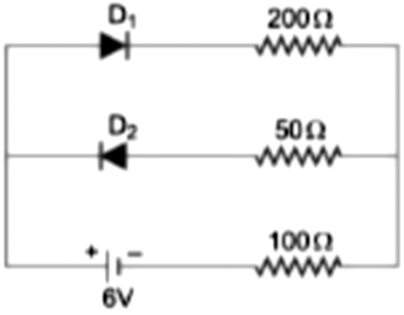
(iii) Why pole pieces are made concave in the moving coil galvanometer?

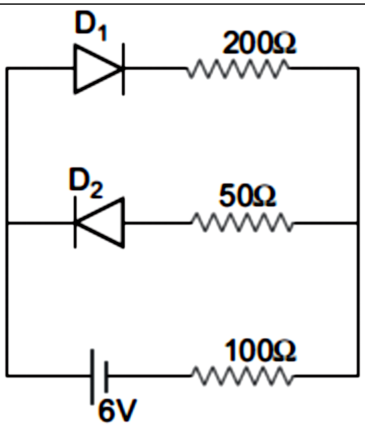
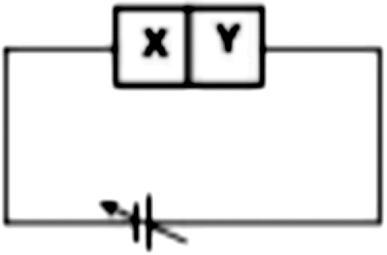
(A) to make the magnetic field radial.

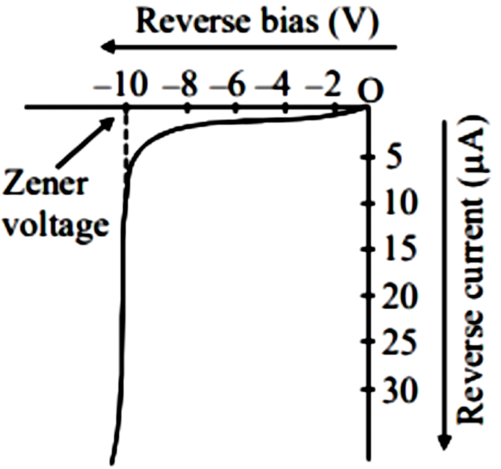
(B) to make the magnetic field uniform.

(C) to make the magnetic field non-uniform.

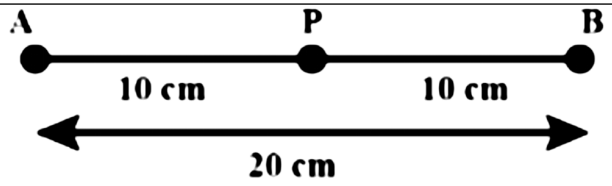
	(D) none of these. **(iv)** A galvanometer can be converted to ammeter by connecting (A)Very high resistance in parallel with the galvanometer (B)Very low resistance in series with the galvanometer (C)Very low resistance in parallel with the galvanometer (D)Very High resistance in series with the galvanometer OR **(iv)**A galvanometer can be converted to voltmeter by connecting (A)Very high resistance in parallel with the galvanometer (B)Very low resistance in series with the galvanometer (C)Very low resistance in parallel with the galvanometer (D)Very High resistance in series with the galvanometer
Ans	(i)(A) Torque acting on a current carrying coil placed in a uniform magnetic field. (ii)(D)90° (iii)(A) to make the magnetic field radial. (iv)(C)Very low resistance in parallel with the galvanometer Or (iv)(B)Very low resistance in series with the galvanometer
	Section E
31	(a) Using phasor diagram, drive an expression for the impedance of a series LCR circuit. What do you mean by resonance condition of such a circuit? (b) (b) Resonant frequency of a series LCR circuit is f find out change in resonant frequency when inductance, Resistance and Capacitance each become half of its initial value. OR (a) With the help of a labelled diagram explain the principle, construction and working of a transformer. (b) A transformer having efficiency of 90% is working on

	200 V and 3 kW power supply. If the current in the secondary coil is 6 A, find out the voltage across the secondary coil and the current in the primary coil .
Ans	Here, Efficiency of the transformer $\eta = 90\%$ Input power, $P_{in} = 3\ \text{kW} = 3 \times 10^3\ \text{W} = 3000\ \text{W}$ Voltage across the primary coil, $V_p = 200\ \text{V}$ Current in the secondary coil, $I_s = 6\ \text{A}$ As $P_{in} = I_p V_p$ $\therefore$ Current in the primary coil, $I_p = \frac{P_{in}}{V_p} = \frac{3000\ \text{W}}{200\ \text{V}} = 15\ \text{A}$ Efficiency of the transformer, $\eta = \frac{P_{out}}{P_{in}} = \frac{V_s I_s}{V_p I_p}$ $\therefore \quad \frac{90}{100} = \frac{6V_s}{3000}$ or $V_s = \frac{90 \times 3000}{100 \times 6} = 450\ \text{V}$
32	(a) With the help of circuit diagram explain the working of full wave rectifier. Also draw input and output waveform (b) A circuit shown in the figure contains two diodes each with a forward resistance 60ohm and infinite backward resistance calculate the current in the 100ohm resistance 

Ans	 Diode D_1 offers a resistance of 50W and D_2 an infinite resistance. It means diode D_1 conducts and diode D_2 does not conduct. So for conducting path through diodes, $I = \frac{\text{emf}}{\text{Net resistance}} = \frac{6}{50 + 200 + 100} = \frac{6}{350} = 0.0171\ A$ A current of 0.171A will flow through 100Ω resistor.
	OR (a) With the help of circuit diagram explain the working of half wave rectifier. Also draw input and output waveform (b)Two semi-conductor materials X and Y shown in the figure are made by doping a Ge crystal with Indium and Arsenic respectively .They are joined end to end and connected to a battery as shown  i) Will the junction be forward bias or reverse bias
Ans	**Material X (Indium-doped):** Indium (In) is a trivalent impurity, making the Germanium lattice a **p-type semiconductor**

	Material Y (Arsenic-doped): Arsenic (As) is a pentavalent impurity, making the lattice an **n-type semiconductor .** The diagram shows the p-type material (X) connected to the positive terminal of the battery, and the n-type material (Y) connected to the negative terminal of the battery, so the junction is **reverse biased** . ii) Sketch a V-I graph for this arrangement is 
33	a) State Gauss's theorem in electrostatics. Using this theorem, derive an expression for the electric field due to an infinitely long straight wire of linear charge density λ. (b)Two point charges q_1 = 3 μC and q_2 = –3 μC are located 20 cm apart in vacuum. (i) What is the electric field at the midpoint O of the line AB joining the two charges? (ii) If a negative test charge of magnitude 1.5×10^{-9} C is placed at this point, what is the force experienced by the test charge?

Ans



Given: $q_A = 3\mu C$, $q_B = -3\mu C$, r = 20 cm 0.2 m, E_R = ?, F = ?

Electric intensity due to q_A on P $E_A = \frac{1}{4\pi\epsilon_0}\frac{q_A}{r^2}$

$$E_A = \frac{9 \times 10^9 \times 3 \times 10^{-6}}{(0.1)^2} = \frac{27 \times 10^3}{(0.1)^2} = \frac{27 \times 10^3}{0.01}$$

$$E_A = 2700 \times 10^3 NC^{-1} = 2.7 \times 10^6 NC^{-1}$$

$$E_A = E_B = 2.7 \times 10^6 NC^{-1}$$

(a) Resultant field, $E_R = E_A + E_B$ $= 2.7 \times 10^6 + 2.7 \times 10^6$

$E_R = 5.4 \times 10^6$ N/C along AB

(b) $F = Eq = 5.4 \times 10^6 \times 1.5 \times 10^{-9}$

$F = 8.1 \times 10^{-3}$N along BA.

OR

(a)Define electric flux and write its SI unit. Use Gauss's law to obtain the expression for the electric field due to a uniformly charged infinite plane sheet of charge.

(b) A point charge causes an electric flux of -1.0×10^3 Nm^2/C to pass through a spherical Gaussian surface of 10.0 cm radius centered on the charge.

(i) If the radius of the Gaussian surface were doubled, how much flux would pass through the surface?

(ii) What is the value of the point charge?

Ans	
	(b) (i) Electric flux, $\Phi = -1.0 \times 10^3$ N m^2/C Radius of the Gaussian surface, r = 10.0 cm Electric flux piercing out through a surface depends on the net charge enclosed inside a body. It does not depend on the size of the body. If the radius of the Gaussian surface is doubled, then the flux passing through the surface remains the same i.e., -10^3 N m^2/C. (ii) Electric flux is given by the relation $\phi = \frac{q}{\varepsilon_0}$ Where, ε_0 = Permittivity of free space = 8.854×10^{-12} $N^{-1}C^2$ m^{-2} q = Net charge enclosed by the spherical surface = $\varepsilon_0\phi$ $= -1.0 \times 10^3 \times 8.854 \times 10^{-12}$ $= -8.854 \times 10^{-9}$ C = –8.854 nC