|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**

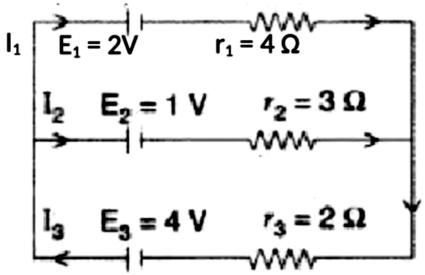
Section A (Each question carries 1 mark)	
1	The distance of closest approach of an alpha particle is d when it moves with a speed v towards a nucleus. Another alpha particle is projected with higher energy such that the new distance of the closest approach is d/4. The speed of projection of the alpha particle in changed situation is- (A) V /2 (B) √2 V (C) 2 V (D) 4 V
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
3	Colours observed on a CD (Compact Disk is due to (A) Reflection (B) Diffraction (C) Dispersion (D) Absorption
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

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
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
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
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
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 (C) $4X10^{-14}$ J (D) None of these
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
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

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
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.
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.
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.
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.
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. 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 $\lambda/4$?
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 ?
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.

21	A platinum surface having work function 5.63 eV is illuminated by a monochromatic source of 1.6×10^{15} Hz. What will be the minimum wavelength associated with the ejected electron.
	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.
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 2 and Is in the circuit diagram shown. 
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?, 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?
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	**Read the following paragraph & answer the questions follow** 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 (iii) Which one of the following is not electromagnetic in nature? (a) X-rays

	(b) gamma rays (c) cathode rays (d) infrared rays (iv) Which of the following has minimum wavelength? (a) X-rays (c) gamma rays (b) ultraviolet rays (d) cosmic 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 (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 (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 (iv) The characteristic of wave that remain unchanged after reflection or refraction is (a) speed (b) frequency (c) wavelength (d) momentum OR The wave front of beam of parallel light is (a) Spherical

	(b) Plane (c) cylindrical (d) None
	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. 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
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

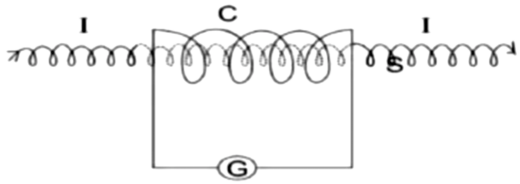
(a) The shunt resistance required to enable the ammeter to measure current upto 5.0 A

(b) The combined resistance of the ammeter and the shunt.

OR

(i) Using Ampere's circuital law, obtain an expression for the magnetic field along the axis of a current carrying solenoid of length I 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.
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 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?