MODEL QUESTION PAPER

Physics

XII Standard (CBSE)

Time: 3 Hours **Max. Marks: 70**

General Instructions:

1. There are 35 questions in all. All questions are compulsory.
2. This question paper has five sections: Section A, Section B, Section C, Section D and Section E. All the sections are compulsory.
3. Section A contains eighteen MCQ of 1 mark each, Section B contains seven questions of two marks each, Section C contains five questions of three marks each, section D contains three long questions of five marks each and Section E contains two case study based questions of 4 marks each.
4. There is no overall choice. However, an internal choice has been provided in section B, C, D and E. You have to attempt only one of the choices in such questions.
5. Use of calculators is not allowed.

SECTION-A

Answer all the questions **18×1=18**

S.No.	Questions	Marks
1	When a body is connected to the earth, then electrons from the earth, flow into the body. It means that the body is (a) unchanged (b) an insulator (c) positively charged (d) negatively charged	1
2	If the uniform electric field exists along X-axis, then equipotential is along (a) XY-plane (b) XZ-plane (c) YZ-plane (d) anywhere	1
3	The net charge on a current carrying conductor is (a) zero (b) constant (c) varying (d) negative	1
4	A bar magnet of magnetic moment M is cut into two parts of equal length. The magnetic moment of either part is *(a) M* (b) $M/2$ (c) $2M$ (d) Zero	1
5	The value of peak AC in a 220 V mains is (a) $\sqrt{220}$ V (b) $\sqrt{110}$ V (c) $\sqrt{220}$ V (d) $\sqrt{440}$ V	1

6	Lenz's law is associated with principle of conservation of (a) charge (b) mass (c) energy (d) momentum	1
7	The direction of transmission of electromagnetic wave is (a) Parallel to *E*(b) Parallel to *B* (c) Parallel to *B*#*E*(d) Parallel to *E*#*B*	1
8	The direction of magnetic field produced by a current-carrying small element of any shape is given by (a) Lenz law (b) newton's law(c) right-hand thumb rule(d) Fleming left-hand rule	1
9	The radius of curvature of plane mirror is (a) infinite (b) zero (c) +5 cm (d) -5 cm	1
10	The interference occurs in which of the following waves? (a) transverse (b) longitudinal (c) electromagnetic (d) all of these	1
11	If momentum of a particle is doubled, then its de-Broglie's wavelength will (a) be half (b) be two times (c) be four times (d)remain unchanged	1
12	Rutherford'sα -particle experiment showed that the atoms have (a) proton (b) nucleus (c) neutron (d) electrons	1
13	Among the following whose mass is not equal to the mass of an electron? (a) Proton (b) Hydrogen (c) Positron (d) Neutron	1
14	At 0 K temperature, a *p*-type semiconductor (a) does not have any charge carrier (b) has few holes and few free electrons (c) has few holes but no free electron (d) has equal no. of holes and free electrons	1
15	Minimum number of capacitors of 2 μ F each required to obtain a capacitance of 5 μ F will be (a) 4 (b) 3 (c) 5 (d) 6	1
16	**Assertion:** X-ray travel with the speed of light. **Reason:** X-rays are electromagnetic rays. (a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion. (b) Both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion. (c) Assertion is correct but Reason is incorrect. (d) Assertion is incorrect but Reason is correct.	1
17	**Assertion:** Blue colour of sky appears due to scattering of blue colour. **Reason:** Blue colour has shortest wave length in visible spectrum.	1

	(a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion. (b) Both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion. (c) Assertion is correct but Reason is incorrect. (d) Assertion is incorrect but Reason is correct.	
18	**Assertion:** Standard optical diffraction gratings cannot be used for discriminating between X-ray wavelength. **Reason:** The grating spacing is not of the order of X-ray wavelengths. (a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion. (b) Both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion. (c) Assertion is correct but Reason is incorrect. (d) Assertion is incorrect but Reason is correct.	1

SECTION-B

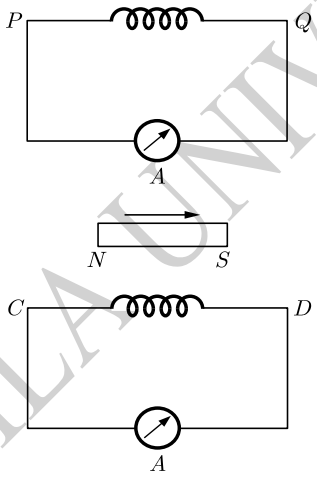
Answer any six questions **7×2=14**

19	A hollow metal sphere of radius 5 cm is charged such that potential on its surface is 10 V. What is the potential at the centre of the sphere?	2
20	Two identical cells, each of emf E, having negligible internal resistance, are connected in parallel with each other access an external resistance R. What is the current through this resistance?	2
21	State two characteristic properties distinguishing behaviour of paramagnetic and diamagnetic materials. **OR** What is the basic difference between magnetic and electric lines of force?	2
22	How does oscillating charge produce electromagnetic waves?	2
23	Define stopping potential. **OR** Write the expression for the de-Broglie wavelength associated with a charged particle having charge q and mass m, when it is accelerated by a potential.	2
24	Consider two different hydrogen atoms. The electron in each atom is in an excited state. Is it possible for the electrons to have different energies but the same orbital angular momentum according to the Bohr model?	2

25	Give two advantages of LED's over the conventional incandescent lamps.	2

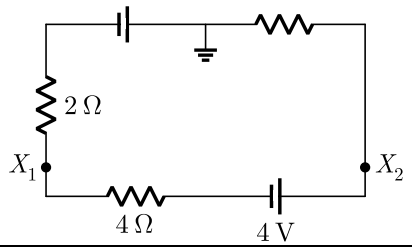
SECTION-C

Answer any six questions **5×3=15**

26	What is the nature of electrostatic force between two point electric charges q_1 and q_2 if 1.$q1+ q2 >0$?, 2. $q1+ q2 < 0$?	3
27	A circular coil of closely wound N turns and radius r carries a current I. Write the expressions for the following: 1. The magnetic field at its centre. 2. The magnetic moment of this coil.	3
28	A bar magnet is moved in the direction indicated by the arrow between two coils PQ and CD. Predict the directions of induced current in each coil.  **R** State a rule to determine the direction of current induced due to the motion of a conductor in a perpendicular magnetic field.	3
29	Conduction and displacement currents are individually discontinuous, but their sum is continuous. **R** Name the parts of the electromagnetic spectrum which is (i) suitable for RADAR systems in aircraft navigations. (ii) used to treat muscular strain. (iii) used as a diagnostic tool in medicine.Write in brief, how these waves can be produced.	3
30	What is difference between diffraction and interference?	3

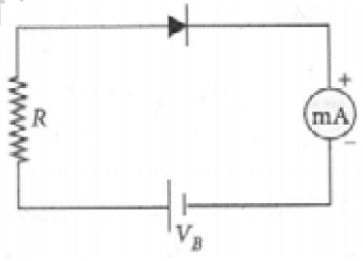
SECTION-D

Answer all the questions 3×5=15

31	What do you understand by the resistivity of a conductor? Discuss its temperature dependence for a 1. Metallic conductor 2. Semiconductor 3. Ionic conductor 4. Electrolyte. **R** Determine the potentials at the points X_1 and X_2 in the circuit.  	5
32	What is alternating current? How alternating e.m.f. and current is represented mathematically. What do you mean by time period, frequency and amplitude of alternating current? **R** Show diagrammatically two different arrangements used for winding the primary and secondary coils in a transformer. Assuming the transformer to be an ideal one, write the expression for the ration of its: 1. Output voltage to input voltage. 2. Output current to input current. Mention two reasons for energy losses in an actual transformer.	5
33	Define the term binding energy. The binding energy of a nucleus Z^AX is given by the formula: B.E. = $[Zm_H + (A\ Z\ m-)_n - m\ (Z^AX\ c)]^2$ where $m\ X\ (Z^A)$ is the atomic mass of X. Derive this equation, state clearly the approximation involved and say it is very safe approximation. **R** Give reason for: (a) Lighter elements are better moderators for a nuclear reactor than heavier elements. (b) In a natural uranium reactor, heavy water is preferred moderator as compared to ordinary water. (c) Cadmium rods are provided in a reactor. (d) Very high temperature as those obtained in the interior of the sun are required for fusion reaction.	5

SECTION-E

Answer all the questions 2×4=8

34	The lens maker's formula relates the focal length of a lens to the refractive index of the lens material and the radii of curvature of its two surfaces. This formula is called so because it is used by manufacturers to design lenses of required focal length from a glass of given refractive index. If the object is placed at infinity, the image will be formed at focus for both double convex lens and double concave lens.Therefore, lens maker's formula is, $\frac{1}{f}$= :$\frac{\mu \mu 2}{\mu}$–1 ^{1}D:$_{R}^{1}$1 –$_{R}^{1}$2D When lens is placed in air,:^{1}1 –^{1}2D μ_1 = 1 andμ μ_2 = . The lens maker formula takes the form, $\frac{1}{f}$ = (μ − 1) **OR** The radius of curvature of each face of biconcave lens with refractive index 1.5 is 30 cm. Calculate the focal length of the lens in air. The radii of curvature of the faces of a double convex lens are .10 cm and 15 cm. If focal length is 12 cm, then what is the refractive index of glass? Why does an under-water swimmer cannot see very clearly even in absolutely clear water? An object is immersed in a fluid then that what should be the condition so the object becomes invisible, it should	4
35	A silicon *p n*- junction diode is connected to a resistor *R* and a battery of voltage V_B through milliammeter (mA) as shown in figure. The knee voltage for this junction diode is V_N = 0 7. *V* . The *p n*- junction diode requires a minimum current of 1 mA to attain a value higher than the knee point on the I-V characteristics of this junction diode. Assuming that the voltage *V* across the junction is independent of the current above the knee point. A *p n*- junction is the basic building block of many semiconductor devices like diodes. Important process occurring during the formation of a *p n*- junction are diffusion and drift. In an n-type semiconductor concentration of electrons is more as compared to holes. In a p-type semiconductor concentration of holes is more as compared to electrons.  (i) If V_B= 5*V*, then calculate the maximum value of *R* so that the voltage *V* is above the knee point voltage. (ii) If V_B = 5*V*, then calculate the value of *R* in order to establish a current to 6 mA in the circuit. (iii) (a) If V_B = 6*V*, then calculate the power dissipated in the resistor *R*, when a current of 6 mA flows in the circuit is. (b) When the diode is reverse biased with a voltage of 6*V* and V_{bi}= 0 63. *V*. Calculate the total potential. **OR** How many junctions do a diode consists?	4