

Time Allowed: 3 Hrs

Marks: 85

Note: There are Three Sections in this paper i.e. A, B and C. Attempt Section-A and return it to the Superintendent within the given time. No marks will be awarded for Cutting, Erasing and Overwriting.

Mobile Phone is strictly prohibited in Examination Hall.

Time: 20 Minutes

SECTION "A"

Marks: 18

Q.1. Choose the correct option and shade one of (A, B, C, D) in the given Bubble Answer Sheet.

- i. PN junction when reversed act as _____.
 (A) Capacitor (B) Inductor (C) ON Switch (D) OFF Switch
- ii. When both the junctions are forward biased, it is _____.
 (A) Active Region (B) Cut-off Region (C) Saturation Region (D) Q-Point
- iii. Pair production cannot take place in vacuum because _____ is not conserved.
 (A) Mass (B) Momentum (C) Energy (D) Charge
- iv. By doubling the absolute temperature of black-body, the total energy radiated will change by a factor of _____.
 (A) 0.5 (B) 2 (C) 4 (D) 16
- v. Which of the following series of hydrogen spectra lies in the visible region of the spectrum?
 (A) Lyman (B) Balmer (C) Paschen (D) Brackett
- vi. Electromagnetic force is caused by exchange of _____.
 (A) Electrons (B) Protons (C) Neutrons (D) Photons
- vii. One curie is equal to _____.
 (A) $3.70 \times 10^{-10} Bq$ (B) $3.70 \times 10^{10} Bq$ (C) $1 \times 10^{10} Bq$ (D) $1 MBq$
- viii. Which of the following is a boson?
 (A) Proton (B) Neutrino (C) Photon (D) Pion
- ix. The electric field intensity due to infinite sheet of charges is given by $\vec{E} =$ _____.
 (A) $\frac{\delta}{\epsilon_0} \hat{r}$ (B) $\frac{\delta}{2\epsilon_0} \hat{r}$ (C) $\frac{Q}{\epsilon_0}$ (D) $\frac{\delta A}{\epsilon_0}$
- x. $1 \text{ GeV} =$ _____.
 (A) 10^9 eV (B) 10^6 eV (C) 10^{12} eV (D) 10^{15} eV
- xi. The electric field intensity inside a conductor is taken _____.
 (A) Positive (B) Negative (C) Constant (D) Zero
- xii. The particular temperature at which the thermo emf becomes zero is called _____ temperature.
 (A) Neutral (B) Curie (C) Inversion (D) Critical
- xiii. How much voltage is required to make 2A through a resistance of 8Ω .
 (A) $16A\Omega$ (B) $16A\Omega^{-1}$ (C) $16\Omega A^{-1}$ (D) $A^{-1}\Omega^{-1}$
- xiv. If the charge is at rest in magnetic field, then force on charge is _____.
 (A) qvB (B) $qvB \sin \theta$ (C) $qvB \cos \theta$ (D) zero
- xv. When a coil rotate in magnetic field, the induced current in it _____.
 (A) Continuously changes (B) Remain same (C) Becomes maximum (D) Becomes zero
- xvi. The peak value of alternating current is $5\sqrt{2}$. The mean square value of current will be _____.
 (A) 5A (B) 2.5A (C) $5\sqrt{2}A$ (D) 5^2
- xvii. For Young's Modulus, $Y =$ _____.
 (A) $\frac{F}{A\theta}$ (B) $\frac{\Delta P}{(-\Delta V/V)}$ (C) $\frac{Fl}{A\Delta L}$ (D) $\frac{F}{A}$
- xviii. A wire is stretched to double of its length. Its strain is _____.
 (A) 0 (B) 0.5 (C) 1 (D) 2

ESKPxII-XXV (I)
PHYSICS PART-II

Time: 2 Hours 40 Minutes

Malakand 2025

SECTION "B"

Marks: 40

Q.2. Give Answers to any TEN (10) questions of the following. All questions carry equal marks.

- i. Define: Resistance, Conductance, Resistivity, Conductivity.
- ii. How can electric potential be high, when electric potential energy is relatively low?
- iii. Show that maximum power output $P_{out} = \frac{\epsilon^2 R}{(R-r)^2 + 4Rr}$
- iv. Why voltage is always measured between two points?
- v. How does a current carrying coil behave like a bar magnet?
- vi. Differentiate between permeability and permittivity.
- vii. Show that the relation $\epsilon = \frac{\Delta\Phi}{\Delta t}$ is dimensionally correct.
- viii. Show that reactance is measured in ohms for both inductors and capacitors.
- ix. How can conductivity of a semi-conductor be raised?
- x. If an electron and a proton have the same de-Broglie wavelength, which particle has greater speed?
- xi. Why it was necessary to quantize angular momentum in Bohr's model of the atom?
- xii. Crystal lattices can be examined with x-rays but not UV. Why?
- xiii. What factors make a fusion reaction difficult to achieve?

SECTION "C"

Marks: 27

Note: Attempt any THREE (03) questions from the following. Each question carries equal marks.

- Q.3. a) State and explain Coulomb's law of electrostatics. (05)
b) Calculate the resistance of a copper wire having length 2km and 22mm² cross-sectional area. Assume the resistivity is $18 \times 10^{-9} \Omega \cdot m$. (04)
- Q.4. a) State and explain Faraday's law of electromagnetic induction. Differentiate between statically and dynamically induced emf. (05)
b) For the same RLC series AC circuit having 40 Ω resistor, 3mH inductor and 5 μ F capacitor. Find the resonant frequency. (04)
- Q.5. a) State Einstein's postulates of special theory of relativity. Discuss its various results. (05)
b) Find the wavelength of electron that has been accelerated through a potential difference of 200V. (04)
- Q.6. Give a brief explanation of any two of the following. (09)
 - i. Gauss's Law
 - ii. The Uncertainty Principle
 - iii. Nuclear Fusion