Rawalpindi Board Group-II *(First Annual Examination 2025)*

HSSC-(P-II)-A-2025

Roll No. ____ *To be filled in by the candidate.*	(For all sessions)	Paper Code 8 4 7 6

Physics (Objective) **Group - II**

Time: 20 Minutes **Marks: 17**

Note: Write answers to the questions on objective answer sheet provided. Four possible answers A, B, C & D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with Marker or pen ink on the answer sheet provided.

Q1.

1. **In a semiconductor, a moving hole is equivalent to a moving:**
   (A) Electron (B) Ion (C) Positive charge (D) Atom
2. **One of the most important building block of electronic devices is:**
   (A) Silicon (B) p-n Junction (C) Rectifier (D) Operational amplifier
3. **The mathematical notation for NOT operation is:**
   (A) $X = A + B$ (B) $X = \bar{A}B + A\bar{B}$ (C) $X = \bar{A}$ (D) $X = \overline{A.B}$
4. **Special theory of relativity is based upon two postulates.**
   (A) True (B) False
   (C) True for non-inertial frames (D) True for absolute motion
5. **Minimum energy required for electron-positron pair production is:**
   (A) 1.6 MeV (B) 1.02 MeV (C) 0.51 MeV (D) 2.43 MeV
6. **Longest wavelength of Paschen series is:**
   (A) 656 nm (B) 1875 nm (C) 820 nm (D) 122 nm
7. **Range of β-particles is more than range of α-particles:**
   (A) 100 times (B) 20 times (C) 300 times (D) 10^{10} times
8. **A does of 100 red will deposit a energy to an object of 250 kg:**
   (A) 250 J (B) 2.50×10^{4} J (C) 2.50 J (D) 0.400 J
9. **Electric field lines due to a positive pint charge are:**
   (A) Radially outwards (B) Radially inwards (C) Parallel (D) Curved
10. **How many electron-volt make one joule energy?**
    (A) 1.6×10^{-19} (B) 3×10^{8} (C) 6.25×10^{18} (D) 1
11. **Which is the unit of electromotive force?**
    (A) Watt (B) Joule (C) Ampere (D) Volt
12. **Force acting on a positive pint charge q in a magnetic field $\vec{B}$ is given by formula:**
    (A) $q\vec{B}$ (B) $q(\vec{v}\times\vec{B})$ (C) $q/\vec{B}$ (D) $q(\vec{B}.\vec{v})$
13. **In order to convert a galvanometer into a voltmeter of rang V, required series resistance is:**
    (A) $\frac{V}{I_g}$ (B) $\frac{V}{R_g} - I_g$ (C) $\frac{V}{I_g} - R_g$ (D) $R_g + \frac{V}{I_g}$
14. **The unit of self-inductance can be expressed:**
    (A) Vs A (B) Ωs^{-1} (C) VA^{-2} (D) Vs A^{-1}
15. **Device working on principle of mutual induction between two coils is:**
    (A) Motor (B) Generator (C) Inductor (D) Transformer
16. **Voltage leads current by 90°:**
    (A) Capacitor (B) Resistor (C) Inductor (D) Series RC circuit
17. **In and AC circuit, the ratio of power dissipation and V_{rms} I_{rms} is called:**
    (A) Energy (B) Power factor (C) Phase (D) Choke factor

Roll No. ____ *To be filled in by the candidate.* **HSSC-(Part-II)-A-2025 (For all sessions)**

Physics (Subjective) **Marks: 68**

Time: 2.40 Hours

(GROUP-II)

SECTION - I

Q2. Write short answers of any eight parts from the following: **(8×2=16)**

(i) Describe the force of forces on a positive point charge when placed between parallel plates with opposite and equal charges.

(ii) If a point charge q of mass m is released in a non-uniform electric field with field lines pointing in the same direction, will it make a rectilinear motion?

(iii) If a charged particle moves in a straight line through some region of space, can you say that the magnetic field in the region is zero?

(iv) How can a current loop be used to determine the presence of a magnetic field in a given region of space?

(v) What fraction of a radioactive sample decays after to half-lives have elapsed?

(vi) Describe a brief account of interaction of various types of radiations with matter.

(vii) What is lamp and scale arrangement in galvanometer?

(viii) What is meant by EEG and ERG?

(ix) Define Hadrons and leptons.

(x) Write any two uses of CRO.

(xi) What are the basic forces? Write the names of basic forces of nature?

(xii) Show that $1\ ^{N}/_{C} = 1\ ^{V}/_{m}$

Q3. Write short answers of any eight parts from the following: **(8×2=16)**

(i) Do bends in a wire affect its electrical resistance? Explain.

(ii) What are the difficulties in testing whether the filament of a lighted bulb obeys Ohm's law?

(iii) Why some of the electrons are free in conductors? Give reason.

(iv) A sinusoidal current has rms value of 10 A. What is the maximum or peak value?

(v) What is meant by A.M and F.M?

(vi) In R-L circuit, will the current lag or lead the voltage? Illustrate your answer by a vector diagram.

(vii) What is meant by para, dia and ferromagnetic substances? Give example.

(viii) Distinguish between forbidden energy states and forbidden energy gap.

(ix) What is difference between elasticity and plasticity?

(x) Why ordinary silicon diodes do not emit light?

(xi) What is the net charge on n-type or a p-type substance?

(xii) Why is base current in a transistor very small?

Q4. Write short answers of any six parts from the following: **(6×2=12)**

(i) How would you position a flat loop of wire in a changing magnetic field, so that there is no emf induce in the coil?

(ii) We do not notice the de-Broglie wavelength for a pitched cricket ball. Explain why?

(iii) We do you mean by mutual induction?

(iv) Why pair production cannot be caused by x-ray photon?

(v) Enlist the biological effects of x-rays.

(vi) What is meant by spontaneous emission of radiation?

(vii) Enlist four uses of photocell.

(viii) What are the postulates of special theory of relativity?

(ix) State the Lenz's law.

SECTION - II

Note: Attempt any THREE questions. Each question carries equal marks: **(3×8=24)**

Q5. (a) **State Kirchhoff's Rules. Explain the algebraic sum of potential changes in a closed circuit is zero.** 5

(b) **Two point charges $q_1 = -1.0 \times 10^{-6}$ C and $q_2 = 4.0 \times 10^{-6}$C are separated by a distance of 3.0m. Find and justify the zero field location.** 3

Q6. (a) **State Ampere's law Calculate the magnetic field intensity inside a current carrying solenoid by using Ampere's law.** 5

(b) **Two coils are placed side by side. An emf of 0.8V is observed in one coil when the current is changing at the rate of 200 As-1 in the other coil. What is the mutual inductance of the coils?** 3

Q7. (a) **What is rectification? Explain full-wave rectification with circuit diagram. How pulsating D.C is converted into smooth D.C?** 5

(b) **A 10 m, 20Ω coil is connected across 240 V and $\frac{180}{\pi}$ Hz source. How much power does it dissipate?** 3

Q8. (a) **What is doping? Describe the formation of n-type and p-type semiconductors.** 5

(b) **What is the de-Broglie wavelength of an electron whose kinetic energy is 120 eV?** 3

Q9. (a) **Explain the principle, construction and working of Wilson Cloud Chamber. How it has helped in the discovery of new particles?** 5

(b) **Calculate the longest wavelength of radiation for the paschen series.** 3