Version No.				
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ROLL NUMBER						

PHYSICS HSSC-II

SECTION – A (Marks 17)

Time allowed: 25 Minutes

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed.

Do not use lead pencil.

حصہ اوّل لازمی ہے۔ اس کے جوابات اسی صفحہ پر دے کر ناظم مرکز کے حوالے کریں۔ کاٹ کر دوبارہ لکھنے کی اجازت نہیں ہے۔ لیڈ پنسل کا استعمال ممنوع ہے۔

Answer Sheet No. _____

ہر سوال کے سامنے دیے گئے، کریکولم کے مطابق درست دائرہ کو پُر کریں۔ **Invigilator Sign.** _____

Fill the relevant bubble against each question according to curriculum: **Candidate Sign.** _____

	Question	A	B	C	D	A	B	C	D
1.	Which nuclear reaction is the source of energy in stars?	Chain reaction	Radioactivity	Fusion	Fission	○	○	○	○
2.	The energy released in nuclear reactions is given by:	Q = mCΔT	E = Δmc²	F = ma	V = IR	○	○	○	○
3.	The electric diploe moment is the product of:	Charge and force	Charge and electric field	Charge and voltage	Charge and displacement	○	○	○	○
4.	The SI unit of electric flux is:	V/m	C/N	N/C	N·m²/C	○	○	○	○
5.	According to Gauss's law, the electric field inside a hollow conductor is:	Decreasing	Zero	Constant	Increasing	○	○	○	○
6.	Which physical law relates current through a conductor to voltage and resistance?	Ampere's law	Faraday's law	Kirchhoff's law	Ohm's law	○	○	○	○
7.	The force on a current carrying conductor placed in a magnetic field is maximum when the conductor is:	At 45° to the field	Out of the field	Perpendicular to the field	Parallel to the field	○	○	○	○
8.	According to Faraday's law, the induced emf is proportional to the:	Rate of change of magnetic flux	Inverse of magnetic flux	Square of magnetic flux	Magnetic flux	○	○	○	○
9.	In an AC circuit, the voltage and current are out of phase by 90° when the circuit is purely:	Inductive	Conductive	Resistive	Capacitive	○	○	○	○
10.	The energy gap in conductors is:	Zero	Moderate	Very large	Small	○	○	○	○
11.	The temperature at which a ferromagnetic material becomes paramagnetic is called:	Absolute temperature	Knee temperature	Critical temperature	Curie temperature	○	○	○	○
12.	In forward biasing of a p-n junction diode, the potential barrier:	Decreases	Disappears	Increases	Remains constant	○	○	○	○
13.	The photoelectric effect provides evidence for:	Dual nature of light	Diffraction of light	Particle nature of light	Wave nature of light	○	○	○	○
14.	According to Einstein's equation of photoelectric effect, the maximum kinetic energy of emitted electrons depends upon:	Number of photons	Velocity of light	Frequency of light	Intensity of light	○	○	○	○
15.	Conversion of A.C into D.C is called:	Oscillation	Rectification	Modulation	Amplification	○	○	○	○
16.	Which of the following series of hydrogen spectra lies in the visible region of the spectrum?	Paschen series	Brackett series	Lyman series	Balmer series	○	○	○	○
17.	The time required for half of a radioactive sample to decay is called:	Half-life	Decay constant	Mean life	Average life	○	○	○	○

- $\varphi_E = \vec{E}.\vec{A}$
- $\vec{F} = I(\vec{L} \times \vec{B})$
- $\frac{1}{\lambda} = R_H\left[\frac{1}{p2} - \frac{1}{n^2}\right]$
- $P = |Qd|$
- $V = IR$
- $\varepsilon = \frac{\Delta\varphi}{\Delta t}$

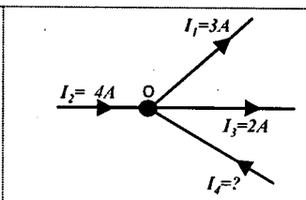
III

PHYSICS HSSC–II

Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

SECTION – B (Marks 42)

Q. 2 Answer the following parts briefly. **(14x3=42)**

(i)	Find electric field at a distance of 30cm from a 3μC point charge.	03	OR	State Ohm's law. Derive its mathematical form and give its limitations.	1+1+1
(ii)	State Faraday's law of electromagnetic induction and give one practical application.	2+1	OR	Distinguish between conductors and insulators on the basis of energy band theory.	1.5 + 1.5
(iii)	State Kirchhoff's current law (KCL). Apply it to a simple junction given and calculate I_4. 	1+2	OR	In the Rydberg formula $\frac{1}{\lambda_R} = R_H\left[\frac{1}{p^2} - \frac{1}{n^2}\right]$ Determine the values of 'p' and 'n' for Lyman and Paschen series for Hydrogen atom.	1.5 + 1.5
(iv)	Describe briefly the motion of a charged particle in a uniform magnetic field.	03	OR	A 60V resistor is connected across A.C supply of 220V. Calculate the current drawn from the supply and the power consumed by the heating element.	03
(v)	Briefly explain the role of moderators and control rods in nuclear reactors.	1.5 + 1.5	OR	Briefly explain the working of potentiometer with circuit diagram.	2+1
(vi)	Apply Gauss's law to explain electric field intensity inside a hollow conductor.	03	OR	Briefly explain the phenomenon of photoelectric effect with Einstein's equation.	03
(vii)	Deduce the expression for maximum output power delivered to a load resistance.	03	OR	How are eddy currents produced? Explain briefly.	03
(viii)	Differentiate between self-induction and mutual induction. Draw also their circuit diagrams.	1.5 + 1.5	OR	Differentiate between nuclear fission and nuclear fusion reactions with examples.	1.5 + 1.5
(ix)	Distinguish between soft and hard ferromagnetic materials by drawing their curves.	1.5 + 1.5	OR	What is meant by 'Conductance' and 'Conductivity' of a material? Give their SI units.	1.5 + 1.5
(x)	What is meant by rectification? Draw circuit diagram of a half wave rectifier using diode.	1+2	OR	Briefly explain the construction and working of a transformer.	1+2
(xi)	Compare inertial and non-inertial frames of reference. Give one example each.	1.5 + 1.5	OR	What is meant by electric potential at a point? Write its unit.	2+1
(xii)	State Ampere's law. Describe the strength of magnetic field. a. Inside a current carrying solenoid and b. Outside a current carrying solenoid	1+1+1	OR	What is meant by impedance? Draw phasor diagram of RL series circuit.	1+2
(xiii)	Discuss factors affecting the resistance of a conductor. (Any three)	03	OR	Discuss de Broglie's hypothesis of matter waves.	03
(xiv)	Briefly explain Einstein's mass–energy relation and its nuclear applications.	2+1	OR	Briefly describe the following: a. Tensile stress b. Young's modulus	1.5 + 1.5

SECTION – C (Marks 26)

Note: Attempt the following questions.

Q.3	Derive the expression for capacitance of a parallel plate capacitor With and Without dielectric.	07	OR	What is meant by motional emf? Compute the potential difference across the ends of rod moving through a magnetic field in a simple way.	2+5
Q.4	Explain with derivation the behaviour of a pure inductive AC circuit and draw its phasor diagram.	5+2	OR	Using Bohr's postulates, derive the expression for energy levels of hydrogen atom.	07
Q.5	Describe a PN junction and discuss its forward and reverse biasing with diagrams.	2+2+2	OR	Explain the implication of mass increase, time dilation and length contraction for space travel.	2+2 +2
Q.6	Explain magnetic field of a solenoid. Derive expression for field inside a long solenoid using Ampere's law.	2+4	OR	Explain the construction and working of a Geiger-muller counter.	06

$E = K\frac{q}{r^2}$ $E = \frac{F}{q}$ $\sum B.\Delta L = \mu oI$ $I = \frac{V}{X_L}$ $\varphi_E = \vec{E}.\vec{A}$ $K = 9\times10^9 Nm^2C^{-2}$

$Z = \sqrt{R^2 + X_L^2}$ $X_L = 2\pi fL$ $V = IR$ $C_{vac} = \frac{\varepsilon oA}{d}$ $Y = \frac{F/A}{\Delta L/L}$ s $Stress = \frac{F}{A}$

$P = VI$ $\lambda = \frac{h}{mv}$ $K.E_{max} = hf - \phi$ $\frac{1}{\lambda} = R_H\left[\frac{1}{p^2} - \frac{1}{n^2}\right]$ $F = I(\vec{L}\times\vec{B})$ $\sum I = 0$