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.

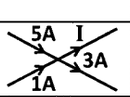
Do not use lead pencil.

حصہ اوّل لازمی ہے۔ اس کے جوابات اسی صفحہ پر دے کر نگرانِ 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 one belongs to Lepton's group?	Electron	Proton	Neutron	Pion	○	○	○	○
2.	The unit of electric field intensity $\vec{E}$ is:	Vm	NC^{-2}	Vm^{-1}	NmA^{-1}	○	○	○	○
3.	Capacitance of a capacitor can be increased by:	Using battery of high potential	Increasing distance between the plates	Decreasing area of plates	Inserting dielectric between the plates	○	○	○	○
4.	Use Kirchhoff's first law to deduce the value of Current I in figure: 	4A	1A	2A	3A	○	○	○	○
5.	The correct relationship between ε and V_t for a ***closed circuit*** is:	$\varepsilon = V_t - Ir$	$\varepsilon = V_t$	$\varepsilon > V_t$	$\varepsilon < V_t$	○	○	○	○
6.	**Ohm–meter** is the SI unit of:	Resistivity	Resistance	Conductivity	Conductance	○	○	○	○
7.	Lenz's law is in accordance with the law of conservation of:	Mass	Charge	Momentum	Energy	○	○	○	○
8.	Primary function of transformer is to change:	The level of alternating voltage	Alternating current into direct current	Mechanical energy into heat energy	The direction of alternating current	○	○	○	○
9.	Magnetic flux will be minimum if the angle between magnetic field strength and area vector is:	90^o	0^o	45^o	60^o	○	○	○	○
10.	At high frequency in an inductive circuit, the current will be:	Infinite	Large	Small	Zero	○	○	○	○
11.	Identify the diamagnetic material:	Copper	Aluminium	Cobalt	Iron	○	○	○	○
12.	In photoelectric effect, which factor increases by increasing the intensity of incident photon?	Stopping potential	Work function	K.E of electrons	Number of photons	○	○	○	○
13.	The conversion of an alternating current into direct current is called:	Rectification	Amplification	Resolution	Magnification	○	○	○	○
14.	An electron in a hydrogen atom is in its ground state. The minimum energy required to ionize it is:	1.5 ev	13.6 ev	3.4 ev	0.1 ev	○	○	○	○
15.	Initial quantity of a uranium sample is 400g. After 3rd half life how much uranium will be left?	25 g	50 g	100 g	200 g	○	○	○	○
16.	Positron and electron annihilate into:	One γ -ray photon	α - rays	Two γ - ray photons	X-rays	○	○	○	○
17.	Peak value of an AC voltage is 300 V, its rms value is:	212V	300V	220V	320V	○	○	○	○

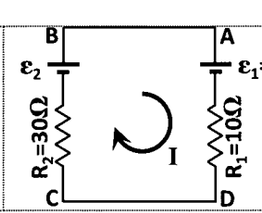
- $\sum I = 0$
- $\Delta K.E = q\Delta V$
- $For\ t = nT_{\frac{1}{2}}, N = \left(\frac{1}{2}\right)^n \times N_o$
- $\varepsilon = \frac{\Delta\phi}{\Delta t}$
- $\phi = \vec{B}.\vec{A}$
- $E = \frac{F}{q} = \frac{\Delta V}{\Delta r}$
- $V_m = \sqrt{2}V_{rms}$
- $X_L = 2\pi fL$
- $E_n = \frac{E_0}{n^2},\ E_0 = 13.6ev$

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)	Distinguish between soft and hard magnetic materials by drawing hysteresis curves.	03	OR	Three arms of a Wheatstone bridge are **75Ω** each. What is the resistance of fourth arm?	03
(ii)	Under what two conditions the terminal potential difference and electromotive force give the same values?	03	OR	Which capacitor stores more amount of charge, a $100\mu F$ capacitor charged to $200V$ or a $200\mu F$ capacitor charged to $100V$?	03
(iii)	Write impedance equation for RLC Series circuit. What can be stated about impedance and current in a circuit at resonance condition?	03	OR	What is meant by the term ***'back emf'*** in any electric motor operation?	03
(iv)	Will higher frequency light eject a higher number of electrons than low frequency light? Justify.	1+2	OR	Briefly describe a circuit which will give continuously varying potential.	03
(v)	An electron and a proton are projected with same velocity normal to the magnetic field, which one will undergo greater deflection? And why?	1+2	OR	Write any three results of special theory of relativity.	03
(vi)	Calculate longest and shortest wavelengths for Paschen series.	1.5+ 1.5	OR	What happens to the atomic number and mass number of a nucleus that emits γ–ray photons?	03
(vii)	What is self-inductance? Write its SI unit. Enlist two factors affecting the inductance of a coil.	03	OR	According to Stephen-Boltmann law what will be the effect on the intensity of radiation emitted by black body when its absolute temperature is doubled?	03
(viii)	How does thermo **emf** vary with temperature for copper-iron thermocouple? Also draw the graph.	2+1	OR	In an RC-Circuit, will the current lag or lead the voltage? Illustrate by drawing waveform and phasor diagram.	03
(ix)	The value in Amperes of an alternating current is given by an equation $I=2Sin(50\pi t)$. What is the peak value of current? What is the frequency(f) of AC supply?	03	OR	Differentiate between conductors and semi-conductors on the basis of energy band theory.	03
(x)	If a person swallows an α-particle and a β-particle, which would be more dangerous? Justify.	03	OR	Differentiate between **N-type semi-conductors** and **P-type semi-conductors**.	03
(xi)	Calculate the voltage ε_2 in the circuit by using Kirchoff's Voltage Law (KVL) when $I=0.2$**A.** 	03	OR	Why in a transistor: **a.** The base is thin and lightly doped? **b.** The collector is large in size?	1.5+ 1.5
(xii)	A metal sphere of radius 20cm has a positive charge of **+2.0μC** at its centre. Find the electric field strength at a distance of **25cm** from the centre of sphere?	03	OR	If a transformer is connected to a steady (DC) supply, no emf is induced across the secondary coil. Why?	03
(xiii)	What is population inversion? Why can LASER action **NOT** occur without population inversion between atomic levels?	1.5+ 1.5	OR	Briefly explain following terms: **a.** Super-conductors **b.** Critical temperature	2+1
(xiv)	Briefly explain the magnetic force acting on a stationary charged particle placed in a uniform magnetic field.	03	OR	Show that the electric field at a point is given by the negative of potential gradient at that point.	1+2

SECTION – C (Marks 26)

Note: Attempt the following questions.

Q.3	State Gauss's law. Draw and find Electric field due to a conducting plate of infinite size having positive charge.	2+5	OR	What is mass spectrograph? Show that the radius of circular path of isotopes depends on its mass by using labelled diagram.	2+5
Q.4	Differentiate spontaneous emission and stimulated emission. Describe the working of He-Ne Laser with diagram.	3+3 +1	OR	Draw symbol diagrams of NPN and PNP transistors. Describe the operation of NPN transistor. Also draw its schematic diagram.	2+4 +1
Q.5	What is meant by motional emf? Compute emf across the ends of a conductor of length L that moves at a steady speed of 'v' at right angle to a uniform magnetic field.	1+5	OR	A coil having a resistance of **7Ω** and an inductance of **31.8mH** is connected to **220V, 50Hz** AC supply. Calculate: **a)** The circuit current **b)** Phase angle **c)** Power factor	06
Q.6	What is meant by photoelectric effect? How did Einstein explain photoelectric effect on the basis of Plank's quantum theory?	2+4	OR	How is charge to mass ratio of electron determined using magnetic field?	06

$E=K\frac{q}{r^2}$ $\quad \Sigma\varepsilon=\Sigma IR$ $\quad Z=\sqrt{R^2+X_L^{\,2}}$ $\quad h=6.626\times10^{-34}Js$ $\quad X_C=\frac{1}{2\pi fC}$

$Z=\sqrt{R^2+(X_L-X_C)^2}$ $\quad X_L=2\pi fL$ $\quad K.E_{max}=\frac{hc}{\lambda}-\phi$ $\quad c=3\times10^8 ms^{-1}$ $\quad I=\frac{V}{Z}$

$\frac{1}{\lambda}=R_H\left[\frac{1}{p^2}-\frac{1}{n^2}\right]$ $\quad Q=CV$ $\quad R_H=1.0974\times10^7 m^{-1}$ $\quad E=\alpha T^4$ $\quad X=\frac{RQ}{P}$

$I=I_m\,\mathrm{Sin}(\omega t)$ $\quad \omega=2\pi f$ $\quad K=9\times10^9 Nm^2C^{-2}$ $\quad \tan\varphi=\frac{X_L}{R}$ $\quad V_t=\varepsilon-Ir$