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Answer Sheet No. _____

Sig. of Candidate. _____

Sig. of Invigilator. _____

PHYSICS HSSC-II

SECTION - A (Marks 17)

Time allowed: 25 Minutes

NOTE:- Section-A is compulsory and comprises pages 1-2. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D . Each part carries one mark.

- (i) The fact that Electric Field exists in space around an electrical charge is _____.
- A. Electrical property B. Gravitational Field
C. Intrinsic property of nature D. All of these
- (ii) One coulomb charge is carried by _____
- A. 6.25×10^{18} B. One electron
C. 1.6×10^{-19} D. None of these
- (iii) Power of an electric generator of voltage (v) and driving current (I) through an appliance is _____
- A. $P=VI$ B. $P = I^2 R$
C. $P = \frac{V^2}{R}$ D. All of these
- (iv) Electric field and potential difference inside a hollow charge conducting sphere are _____
- A. 0,0 B. $\frac{1}{4\pi\epsilon_0} \frac{q}{r}, 0$
C. $0, \frac{1}{4\pi\epsilon_0} \frac{q}{r}$ D. None of these
- (v) Dimensional representation of Planck's constant is the same as _____
- A. Gravitational Constant B. Torque
C. Momentum D. Angular Momentum
- (vi) The deflecting couple in a galvanometer is given by _____
- A. $\frac{NI}{AB}$ B. NAIB
C. $\frac{ABI}{N}$ D. None of these
- (vii) An Inductor may store energy in its _____
- A. Coil B. Electric Field
C. Magnetic Field D. Both B and C
- (viii) In CRO, the time base generator circuit is connected to the _____
- A. X-Plate B. Y-Plate
C. Electron Gun D. Accelerating Electrodes
- (ix) In a.c Circuit at resonance, the phase difference between current and voltage is _____
- A. 90° B. 180°
C. 0° D. 360°

DO NOT WRITE ANYTHING HERE

- (x) Once the resistance of material drops to zero, the _____
- A. Energy is dissipated
 - B. Current is dissipated
 - C. Energy and current both are dissipated
 - D. Energy and current both are not dissipated
- (xi) Radius of 3rd Bohr orbit in hydrogen atom is greater than radius of 1st orbit by _____
- A. 2
 - B. 3
 - C. 4
 - D. 9
- (xii) Component in generator which consumes energy is called _____
- A. Commutator
 - B. Split rings
 - C. Capacitor
 - D. Load
- (xiii) Solid state detector is basically _____
- A. NPN Transistor
 - B. PNP Transistor
 - C. PN Junction
 - D. LED
- (xiv) Half Life of ${}_{38}^{91}\text{Sr}$ is 9.70 hrs. Its decay constant is _____
- A. $1.99 \times 10^{-5} s$
 - B. $1.99 \times 10^{-7} s$
 - C. $1.99 \times 10^5 s$
 - D. 1.99 hrs
- (xv) The circuit which changes input signal at output with phase difference of 180° is called _____
- A. Amplifier
 - B. Inverter
 - C. Non-Inverter
 - D. Switch
- (xvi) Electromagnetic waves do not transport _____
- A. Energy
 - B. Momentum
 - C. Charge
 - D. Information
- (xvii) One Tesla is _____
- A. N A m
 - B. $\text{N A}^{-1} \text{m}^{-1}$
 - C. 10NAm
 - D. None of these

For Examiner's use only:

Total Marks: 17

Marks Obtained:

--- 2HA 1208 (L) ---



PHYSICS HSSC-II

Time allowed: 2:35 Hours

Total Marks Sections B and C: 68

NOTE:- Answer any fourteen parts from Section 'B' and any two questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet-B if required. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Q. 2 Attempt any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines. (14 x 3 = 42)

- (i) Define Electric Flux and give its unit.
- (ii) What is the difference between electrical potential energy and electric potential at any point of an electric field?
- (iii) Define electric power. Obtain the maximum power equation.
- (iv) Why does the resistance of a conductor rise with temperature?
- (v) How can you use a magnetic field to separate isotopes of chemical element?
- (vi) Does the Induced emf in a circuit depend on the resistance of the circuit? Does the induced current depend on the resistance of the circuit?
- (vii) What is stable or dead beat Galvanometer?
- (viii) In a transformer, there is no transfer of charge from the primary to the secondary. How is, then the power transferred?
- (ix) What is a Parallel Resonance circuit? Write down its properties.
- (x) Explain the existence of magnetic domains in Ferromagnetic material.
- (xi) Why do not we observe Compton effect with visible light?
- (xii) If the speed of light were infinite, what would the equations of special theory of Relativity reduce to?
- (xiii) Why are charge carriers not present in the depletion region?
- (xiv) Find the mass m of a moving object with speed $0.8c$.
- (xv) How can the spectrum of hydrogen contain so many lines, when hydrogen contains only one electron?
- (xvi) What is the effect of forward biasing of a diode on the width of depletion region?
- (xvii) What do we mean by the term Critical mass?
- (xviii) What factors make a fusion reaction difficult to achieve?
- (xix) An A.C Voltmeter reads 250 V. What is its peak and instantaneous values if the frequency of alternating voltage is 50 Hz?

SECTION – C (Marks 26)

Note:- Attempt any TWO questions.

(2x13=26)

- Q. 3
- a. Define Mutual Induction. 02
 - b. Derive an expression for energy stored in an Inductor. Also express the energy in term of magnetic field. 06
 - c. A permanent magnet DC motor is run by a battery of 24 volts. The coil of the motor has a resistance of 2 ohms. It develops a back e.m.f of 22.5 volts when driving the load at normal speed. What is the current when motor just starts up? Also find the current when motor is running at normal speed? 05
- Q. 4
- a. What is a Transistor? Describe the construction and operation of a transistor. Also find an expression for its gain. 1+2+2+4
 - b. The current flowing into the base of a transistor is $100 \mu A$. Find its collector current I_C its emitter current I_E and the ratio I_C/I_E , if the value of current gain β is 100. 04
- Q. 5
- a. How are X-rays produced? What are the important properties of X-rays? 5+4
 - b. Calculate the longest wavelength of radiation for the Paschen series. 04



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PHYSICS HSSC-II

SECTION – A (Marks 17)

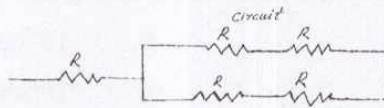
Time allowed: 25 Minutes

NOTE:- Section-A is compulsory and comprises pages 1-2. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

- (i) The Negative of potential gradient is _____.
- | | |
|-----------------------------|-------------------------|
| A. Electric Field Intensity | B. Potential difference |
| C. Electric Potential | D. None of these |

- (ii) Refer to the Figure given below. The effective resistance of the circuit is _____.



- | | |
|--------------------|-------|
| A. 5R | B. 2R |
| C. $\frac{5}{2} R$ | D. 3R |

- (iii) Potentiometer is an accurate measuring instrument because _____.
- | | |
|---------------------------------|--------------------------|
| A. It does not draw any current | B. It has low resistance |
| C. It draws maximum current | D. None of these |

- (iv) Unit of magnetic induction is _____.
- | | |
|----------|---------------|
| A. Gauss | B. Tesla |
| C. Weber | D. Volt/meter |

- (v) As motor speeds up, the value of current decreases because _____.
- | | |
|-----------------------|-----------------------------------|
| A. Of friction loss | B. Increase of resistance of coil |
| C. Back emf increases | D. All of these |

- (vi) Lenz's law is equivalent to the law of conservation of _____.
- | | |
|-------------|-----------|
| A. Momentum | B. Mass |
| C. Energy | D. Charge |

- (vii) Energy stored per unit volume inside the solenoid is _____.
- | | |
|--|---|
| A. $U_m = \frac{2B^2}{\mu_0}$ | B. $U_m = \frac{1}{2} \frac{B^2}{\mu_0} Al$ |
| C. $U_m = \frac{1}{2} \frac{B^2}{\mu_0}$ | D. None of these |

- (viii) Minimum number of Semi Conductor required for full rectification is _____.
- | | |
|------|------|
| A. 5 | B. 2 |
| C. 4 | D. 1 |

- (ix) If $R_1 = 10k\Omega$ and $R_2 = 100k\Omega$, then the gain of the amplifier is _____.
- | | |
|-----------|---------|
| A. 1000kΩ | B. 10kΩ |
| C. 10 | D. -10 |

DO NOT WRITE ANYTHING HERE

- (x) The valiancy of an impurity element added to P-type Semi conductor is _____

A. 3	B. 5
C. 4	D. 6

- (xi) Planck's constant has dimension of _____

A. $\{ML^2 T^{-1}\}$	B. $\{M^2 L T^{-1}\}$
C. $\{ML^2 T^{-2}\}$	D. $\{M^{-1} L^2 T^{-1}\}$

- (xii) For doubling the current in a circuit of constant resistance, the applied voltage must be _____

A. Kept constant	B. Halved
C. Doubled	D. Quadrupled

- (xiii) The residing time of atoms in meta stable state in case of laser action is _____

A. $10^{-5} sec$	B. $10^{-8} sec$
C. $10^{-3} sec$	D. $10^3 sec$

- (xiv) The particles equal in mass or greater than protons are called _____

A. Mesons	B. Baryons
C. Muons	D. Electrons

- (xv) Aluminum is a/an _____

A. Photo conductor	B. Insulator
C. Excellent conductor	D. Bad conductor

- (xvi) In the subatomic world few things can be predicted with _____ precision.

A. 90%	B. 60%
C. 75%	D. 100%

- (xvii) Squids (or Super-Conducting Quantum Interference Devices) are used to detect very weak magnetic field such as produced by the _____

A. Liver	B. Lungs
C. Brain	D. Heart

For Examiner's use only:

Total Marks:

Marks Obtained:

— 2HA 1208 (ON) —



PHYSICS HSSC-II

Time allowed: 2:35 Hours

Total Marks Sections B and C: 68

NOTE:- Answer any fourteen parts from Section 'B' and any two questions from Section 'C' on separately provided answer book. Use supplementary answer sheet i.e. Sheet-B if required. Write your answers neatly and legibly.

SECTION – B (Marks 42)

- Q. 2 Attempt any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines. (14 x 3 = 42)
- How can the positively charged plate of a capacitor be identified?
 - Do electrons tend to go to the region of high potential or of low potential?
 - Describe a circuit which will give a continuous varying potential.
 - The potential difference between the terminals of a battery in open circuit is 2.2 volt. When it is connected across a resistance of 5.0Ω , the potential falls to 1.8 volt. Calculate the current and internal resistance of the battery.
 - What is Shunt resistance? How is it used to convert a Galvanometer into an Ammeter?
 - Why does the picture on a T.V screen become distorted, when a magnet is brought near the screen?
 - Show that \mathcal{E} and $\frac{\Delta\phi}{\Delta t}$ have the same units.
 - What happens to the motor when it is overloaded beyond its limit?
 - Define Choke.
 - How is the reception of a particular radio station selected on your radio set?
 - Why is the base current in a transistor very small?
 - What is a Transistor? How is an NPN transistor drawn in common-Emitter configuration?
 - Distinguish between Conductor, Insulator and Semi-conductor on bases of Energy Band theory of solid.
 - Define Modulus of Elasticity. Show that the units of Modulus of elasticity and stress are the same.
 - An object can not be accelerated to the speed of light. Why?
 - If an electron and a proton have the same de Broglie wavelength, which particle has greater speed?
 - Is energy conserved when an atom emits a photon of light?
 - Why are heavy Nuclei unstable?
 - What is a Radioactive tracer? Describe one application each in Medicine and Industry.

SECTION – C (Marks 26)

- Note:- Attempt any TWO questions. (2 x 13 = 26)
- Q. 3 a. Explain the concept of electric polarization. Discuss how the phenomena of polarization accounts for increase in the capacitance of a capacitor when, instead of air, a dielectric is inserted between its plate. 2+6
- 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. 05
- Q. 4 a. State Ampere's Circuital Law. 02
- b. Find an expression for magnetic flux density inside a long solenoid carrying current (I). 06
- c. You are asked to design a solenoid that will give a magnetic field 0.10T, yet the current must not exceed 10.0A Find the number of turns per unit length that the solenoid should have. 05
- Q. 5 a. What is Laser? Describe the most common type of Laser "Helium-Neon Laser" used in Physics laboratories. Also write the practical uses of laser. 1+4+4
- b. An electron jumps from a level $E_i = -3.5 \times 10^{-19} J$ to $E_f = -1.20 \times 10^{-18} J$. What is the wavelength of the emitted light? 04