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Answer Sheet No. _____

Sig. of Candidate. _____

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PHYSICS HSSC-II

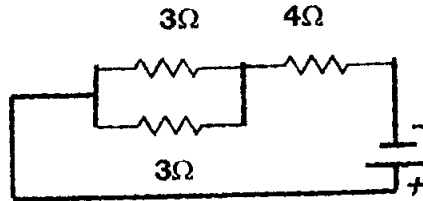
SECTION – A (Marks 17)

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.

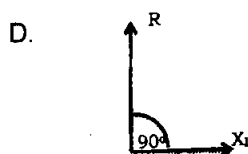
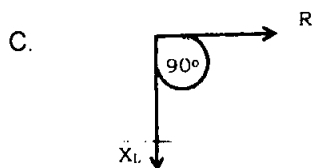
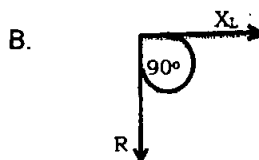
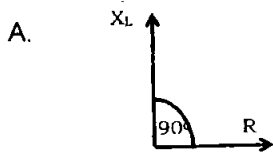
Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

- (i) The work done in moving a positive charge on an equipotential surface is:
- A. Finite and Positive B. Infinite
C. Finite and Negative D. Zero
- (ii) If the temperature of a conductor is increased, the product of resistivity and conductivity:
- A. Increases B. Decreases
C. Remains constant D. May increase or decrease
- (iii) If the current flowing through the 3Ω resistor is $0.8A$, the potential which drops across the 4Ω resistor will be:

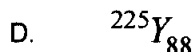
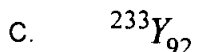
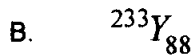
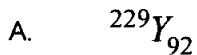


- A. 6.4 volts B. 4.5 volts
C. 8.8 volts D. None of these
- (iv) An Inductor may store energy in:
- A. Its Magnetic field B. Its electric field
C. Its coil D. Battery
- (v) When a particle of charge "q" and mass "m" enters a region of constant magnetic induction "B", traveling with the velocity "v" perpendicular to the direction of the field, it describes a circular orbit of radius:
- A. $R = mq / vB$ B. $R = mv / Bq$
C. $R = mv / Bq$ D. $R = Bq / mv$
- (vi) When the current in a coil changes from 0 to 10 A in 0.025s, an average emf induced in a neighboring coil is 600V, the Mutual inductance for two coils is:
- A. 1.5 Henry B. 12.5 Henry
C. 6 Henry D. 10 Henry
- (vii) A mutually occurring disintegration involving the emission of high energy electrons is called:
- A. Positron Decay B. Beta Decay
C. Gamma Decay D. Alpha Decay
- (viii) The Truth Table of logic function:
- A. Summarizes its output values B. Tabulates all its input conditions only
C. Display' all its input/output possibilities D. Is not based on logic gates
- (ix) In a common base amplifier, the phase difference between the input signal voltage and output signal voltage is:
- A. $\frac{\pi}{4}$ B. π
C. 0 D. $\frac{\pi}{2}$

(x) Which phases diagram is true of RL-Series circuit?



(xi) If $^{233}_{92}\text{U}$ is decayed twice by α - emission, then the resulting isotope is:



(xii) In Compton scattering, the change in wavelength is maximum if:

A. $\theta = 90^\circ$

B. $\theta = 180^\circ$

C. $\theta = 0^\circ$

D. $\theta = 45^\circ$

(xiii) Joule/Ampere is the unit of:

A. Magnetic Induction

B. Magnetic Flux density

C. Magnetic Flux

D. Potential Gradient

(xiv) The Lenz's law refers to:

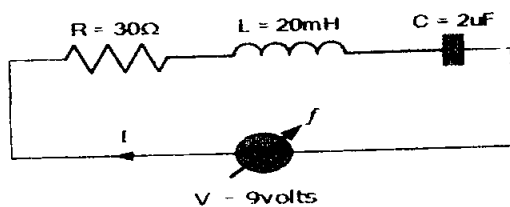
A. Induced Current

B. Induced Potential

C. Motional emf

D. All of these

(xv) Calculate the Resonance frequency with the help of the given RLC Series circuit:



A. 900 Hertz

B. 796 Hertz

C. 245 Hertz

D. None of these

(xvi) The rest mass of photon is:

A. Infinity

B. Zero

C. 1

D. $9.1 \times 10^{-31} \text{ kg}$

(xvii) The Absorption Power of a perfect black body is always:

A. Zero

B. - 1

C. 1

D. 100

For Examiner's use only:

Total Marks:

17

Marks Obtained:



PHYSICS HSSC-II

Time allowed: 2:35 Hours

Total Marks Sections B and C: 68

NOTE: Sections B and C comprise pages 1-2. 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 Answer any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines. (14 x 3 = 42)

- (i) What is the role of material medium if it is placed in between plates of Capacitor?
- (ii) Why the Terminal potential difference of a battery decreases when the current drawn from it is increased? Explain.
- (iii) Briefly describe the term "Resistance Tolerance".
- (iv) Why is Electrical Power lost in transformers? Discuss briefly.
- (v) Define: Diamagnetic, Paramagnetic and Ferromagnetic substances.
- (vi) A wire has resistance 100Ω with its length 10 meter. If the wire is stretched as its length is increased 3 times, what will be its new resistance?
- (vii) A beam of red light and a beam of blue light have exactly the same energy. Which beam contains the greater number of photons?
- (viii) How can the spectrum of hydrogen contain so many lines when hydrogen atom contains only single electron?
- (ix) If an electron is placed in a box about the size of an atom that is about $1 \times 10^{-10} m$, then calculate the velocity of electron.
- (x) An Electron to be confined to a box of the size of the nucleus ($1.0 \times 10^{-14} m$). What would be the speed of the electron if it was so confined?
- (xi) Why Laser action could not occur without population inversion between atomic levels?
- (xii) The radioactive element $^{222}Ra_{88}$ has a half-life of 1.6×10^3 years Since the Earth is about 5 billion years old, how can you explain why we still can find this element in nature?
- (xiii) How much energy is absorbed by a man of mass 80 kg who receives a lethal whole body equivalent dose of 400 rem in the form of low energy neutrons, for which RBE factor is 10?
- (xiv) Define:
 - a. Young's Modulus
 - b. Bulk Modulus
 - c. Shear Modulus

- (xv) A suspended magnet is oscillating freely in a horizontal plane. The oscillations are strongly damped when a metal plate is placed under the magnet. Explain why is this so?
- (xvi) Why does the picture on a TV screen become distorted when a magnet is brought near the screen?
- (xvii) What is Drift velocity? What are the factors on which drift velocity depends?
- (xviii) What do you understand by the term "back emf effect in motors"?
- (xix) Show that " ε " and $\frac{\Delta\phi}{\Delta t}$ have the same units?

SECTION – C (Marks 26)

Note: Attempt any TWO questions. (2 x 13 = 26)

- Q. 3**
- a. Describe Millikan's oil drop experiment to determine charge on an electron. (06)
- b. Discuss Coulomb's law for the interaction of charges in free space and in the presence of any dielectric in between Coulomb's charges. (04)
- c. A capacitor has a capacitance of $2.5 \times 10^{-8} F$. In the charging process, electrons are removed from one plate and placed on the other one. When the potential difference between the plates is 450V, how many electrons have been transferred? (03)
- Q. 4**
- a. What is an A.C generator. Describe its principle, construction and theory (working). Derive an expression for induced emf and current produced in a coil of the A.C generator. (06)
- b. An Alternating current generator operating at 50 Hertz has a coil of 200 turns. The coil has an area of 120 cm^2 . What should be the magnetic field in which the coil rotates in order to produce an emf of maximum value of 240 volts? (04)
- c. Derive an expression for the motional emf developed in a conductor, when moved across a magnetic field. (03)
- Q. 5**
- a. What is Wheat Stone bridge? Explain and prove the principle of Wheat Stone bridge? How can it be used to find the unknown resistance of a wire? (06)
- b. A platinum wire has resistance of 10Ω at $0^\circ C$ and 20Ω at $273^\circ C$. Find the value of temperature co-efficient of resistance of platinum. (04)
- c. State and explain Kirchhoff's Voltage rule. (03)

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Time allowed: 2:35 Hours

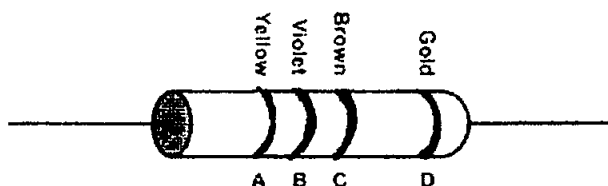
Total Marks Sections B and C: 68

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SECTION – B (Marks 42)

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

- (i) A potential difference is applied across the ends of a copper wire. What is the effect on the drift velocity of free electrons by:
- Increasing the potential difference
 - Decreasing the length and temperature of the wire
- (ii) A particle carrying a charge of $2e$ falls through a potential difference of 3 volt. Calculate the energy acquired by it.
- (iii) Define: Resistivity, Conductivity and Temperature Co-efficient of resistance.
- (iv) Under what circumstances:
- Electromotive force is equal to Terminal potential difference
 - Electromotive force is greater than Terminal potential difference
 - Electromotive force is less than Terminal potential difference
- (v) Alpha particles ranging in speed from 1000 m/s to 2000 m/s enter a velocity selector where the electric field intensity is 300 V/m and the magnetic induction is 0.20 T. Which particle will move un-deviated through the field?
- (vi) What should be the orientation of a current carrying coil in a magnetic field so that torque acting upon the coil is:
- Maximum
 - Minimum
- (vii) Differentiate between Amplitude Modulation and Frequency Modulation.
- (viii) What do you understand by the term "Super Conductivity"?
- (ix) Calculate Resistance range of the following given Carbon Resistor:



- (x) What is the energy of a photon in a beam of infrared radiation of wavelength of 1240 nm?
- (xi) Prove that: $\frac{1}{\lambda} = R_H \left\{ \frac{1}{p^2} - \frac{1}{n^2} \right\}$
- (xii) Write the uses of Laser in Medicine and Industry.
- (xiii) Can X-rays be refracted, diffracted and polarized just like any other wave? Briefly justify.

- (xiv) Discuss the given Nuclear fission Reaction: $^{235}\text{U}_{92} + ^1_0\text{n}_o \rightarrow ^{141}\text{Ba}_{56} + ^{92}\text{Kr}_{36} + 3^1_0\text{n}_o + Q$
- (xv) The Time constant of a series RC circuit is $T=RC$. Verify that Ohm times Farad is equivalent to second
- (xvi) The magnetic field in a certain region is given by $(40i - 18k)\text{Wbm}^{-2}$. How much flux passes through a 5cm^2 area loop in this region if the loop lies flat in the xy-plane?
- (xvii) A wire of 2.5 m long and cross-section area 10^{-5}m^2 is stretched 1.5 mm by a force of 100 N in the elastic region. Calculate:
- The Strain
 - Young's Modulus
 - The Energy stored in the wire
- (xviii) If measurements show a precise position for an Electron, can those measurements show precise momentum also? Explain.
- (xix) Calculate the longest wavelength of radiation for the Paschen Series.

SECTION – C (Marks 26)

Note: Attempt any TWO questions. (2 x 13 = 26)

- Q. 3**
- State and explain Ampere's law. Calculate the magnetic field due to current flowing through Solenoid. (0)
 - What current should pass through a solenoid that is 0.5 m long with 1000 turns of copper wire so that it will have a magnetic field of 0.4 T? (0)
 - Describe how e/m (Charge to mass ration) of an electron can be determined by projecting it perpendicular to a magnetic field. (0)
- Q. 4**
- What is Photoelectric effect? Describe an experimental arrangement to observe the phenomenon. (0)
 - Yellow light of 577 nm wavelength is incident on a cesium surface. The stopping voltage is found to be 0.25 V. Find: (0)
 - The maximum kinetic energy of photoelectrons.
 - The work function of the cesium.
 - State the basic postulates of the Special theory of relativity. (0)
- Q. 5**
- Derive an expression for energy stored in an inductor and also express the energy in terms of magnetic field. (0)
 - The current in a coil of 1000 turns is changed from 5A to zero in 0.2s. If an average emf of 50V is induced during this interval. What is the self-inductance of the coil? Also calculate the flux through each of the coil when a current of 6 A is flowing. (0)
 - Write the working of DC motor. (0)

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