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Roll No. | | | | | | |

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) Molecular spectra are examples of:

A. Line spectra B. Solar spectra

C. Continuous spectra D. Band spectra

(ii) A radioactive decay rate of 3.7×10^{10} disintegrations per second defines the unit of measurement known as the:

A. Rad B. Curie

C. Rutherford D. Rontgen

(iii) Two charges of $10\mu C$ and $14.4\mu C$ are 12cm apart. The force between them is:

A. $9\times10^{7}N$ B. $0.01N$

C. $90N$ D. $9\times10^{5}N$

(iv) The minimum indivisible unit of charge is:

A. The charge on an electron B. One micro coulomb

C. One Coulomb D. The charge on α–particle

(v) The proportionality constant between current and potential difference is:

A. R B. $\frac{1}{P}$

C. P D. $\frac{1}{R}$

(vi) Which of the following properties affects the resistivity of all metals to a great extent?

A. Temperature B. Applied magnetic field

C. Pressure D. Volume

(vii) The magnetic force on an electron travelling $10^{8}ms^{-1}$ perpendicular to a field of strength $1\,Wbm^{-2}$ is:

A. $10^{-11}N$ B. $1.6\times10^{-11}N$

C. Zero D. $10^{8}N$

(viii) If current in two nearby loops is in same order. They:

A. Neither attract or repel B. Attract and Repel

C. Attract D. Repel

(ix) The direction of induced current is always so as to oppose the change which causes the current. This is the statement of:

A. Gauss's law B. Ampere's Law

C. Faraday's Law D. Lenz's Law

(x) Devices that consume electrical energy in the external circuit of generator are know as:

A. Motors B. Appliances

C. Loads D. Machines

(xi) Which one of the following is **NOT** an Advantage of using A.C?

A. Stopping up or down to required voltage B. Maximum line losses

C. Low cost long distance Transmission D. Minimum line losses

(xii) Impedance of series circuit at resonance is:

A. Resistive B. Inductive and Capacitive

C. Inductive D. Capacitive

(xiii) The smallest 3-dimensional structure of crystalline solid which repeats over and over again is:

A. Crystal B. Unit cell

C. Polymer D. Amorphous

(xiv) A crystalline structure yttrium barium copper oxide ($Y Ba_2 Cu_3 O_7$) becomes super conductor at:

A. 200 K B. 173 K

C. 100 K D. 163 K

(xv) Photo diode is **NOT** used in:

A. Logic circuits B. Photo voltaic cell

C. Detection of light D. Automatic switching

(xvi) The gain of the inverting amplifier of external resistances, $R_1 = 50\ K\Omega$ and $R_2 = 200\ K\Omega$ is:

A. -4 B. -6

C. -1 D. -2

(xvii) The Stefen–Baltzman law which relates rate of radiation for a black body to its surface temperature 'T' has the form:

A. $E = \sigma T^2$ B. $E = \sigma T^{-2}$

C. $E = \sigma T^4$ D. $E = \sigma T^{-4}$

For Examiner's use only:

Total Marks:	17
Marks Obtained:	

PHYSICS HSSC–II

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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)

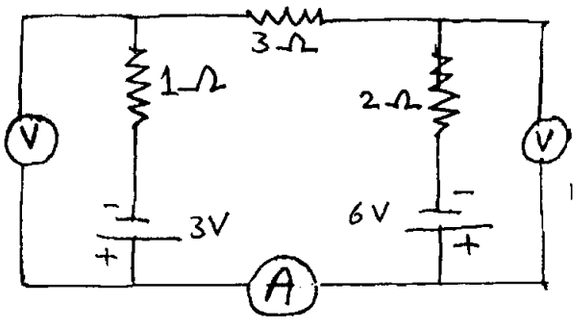
Q. 2 Answer any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines. (14 x 3 = 42)

(i) How can you identify that which plate of capacitor is positively charged?

(ii) How do Shark fish locate their prey precisely?

(iii) Why does the resistance of a conductor rise with temperature?

(iv) Find the reading of the ammeter in the circuit diagram:



(v) If a solenoid is 1 m long and 10 cm in diameter and wound with 10 turns per cm of wire which carries a current of 100A. Calculate the magnetic flux density within it.

(vi) How can you use a magnetic field to separate isotopes of chemical elements?

(vii) What do you understand by electromagnetic induction?

(viii) Can a D.C motor be turned into a D.C generator? What changes are required to be done?

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

(x) What is meant by strain energy? How can it be determined from the force-extension graph?

(xi) How would you obtain n-type and p-type material from pure silicon? Illustrate it by schematic diagram.

(xii) What is meant by open loop gain of op-amplifier?

(xiii) Why a photo diode is operated in reverse biased state?

(xiv) Find the velocity at which the relativistic length 'L' of a body reduces to half of its rest length 'Lo'.

(xv) Photon A has twice the energy of photon B. What is the ratio of the momentum of A to that of B?

(xvi) How can the spectrum of hydrogen contain so many lines when hydrogen contains one electron?

(xvii) Prove that the shortest wavelength photon emitted in Balmer series is 364.6nm.

(xviii) What is a mass spectrograph?

(xix) What is the phenomenon of fluorescence?

SECTION – C (Marks 26)

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

Q. 3 **a.** Define electric field intensity and its unit. Calculate the electric field intensity at a point in the electric field. **(1+1+3=05)**

b. Find the electric field strength required to hold suspended a particle of mass $1.0\times10^{-6}\ kg$ and charge $1.0\mu C$ between two plates 10 cm apart. **(04)**

c. Describe the construction and working of photocopier machine. **(2+2=04)**

Q. 4 **a.** State and explain Ampere's law. Apply it to calculate the magnetic field due to current flowing through a solenoid. **(1+1+4=06)**

b. What current should pass through a solenoid that is 0.5 m long with 10,000 turns of copper wire so that it will have a magnetic field of 0.4T? **(04)**

c. What is an AVO meter? Describe its any two functions. **(1+2=03)**

Q. 5 **a.** What are X-rays? Describe the production of X-rays. **(1+4=05)**

b. Electrons in an X-ray tube are accelerated through a potential difference of 3000 V. If these electrons are slowed down in a target, what will be the minimum wavelength of X-rays produced? **(04)**

c. What are continuous X-rays spectrum? Describe the properties and uses of X-rays. **(2+1+1=04)**

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Roll No. | | | | | | | 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) A solid state radiation detector mainly consists of a:

A. Transistor B. Germanium crystal

C. Silicon crystal D. Silicon diode

(ii) In S.I. units ε_o equals:

A. $1.6\times10^{-19}C$ B. $9\times10^{9}Nm^2C^{-2}$

C. $\frac{4}{9}\times10^{9}Nm^2C^{-2}$ D. $\frac{1}{4\pi}(9\times10^{9})C^2N^{-1}m^{-2}$

(iii) The electrostatic force of repulsion between two electrons 1 metre apart is:

A. $1N$ B. $2.30\times10^{-28}N$

C. $9\times10^{9}N$ D. $1.44\times10^{-9}N$

(iv) If the number of coulombs per second through a wire of 10 Ohms resistance across a 120 volts line is 12, the current flowing through it is:

A. 1.2 A B. 1200 A

C. 120 A D. 12 A

(v) Resistance is independent of:

A. Voltage across a conductor B. Temperature of a conductor

C. Size of a conductor D. Material of a conductor

(vi) An electron travels from left to right in the plane of the paper in a magnetic field perpendicular to and directed into the paper. It is deflected:

A. Out of the paper B. Up

C. Down D. Into the paper

(vii) The e/m of a proton is:

A. Smaller or greater B. Equal to that of an electron

C. Greater than that of an electron D. Smaller than that of an electron

(viii) The induced current can **NOT** be increased by:

A. Making no changes

B. Using a stronger magnetic field

C. Moving the loop faster in magnetic field

D. Replacing the loop by a coil of many turns

(ix) To run a D.C Motor _____ is / are used.

A. Commutator B. Slip rings

C. A.C. main D. Engine

DO NOT WRITE ANYTHING HERE

(x) When we peak of A.C. meter reading, we usually mean?

A. Average value B. R.M.S value

C. Instantaneous value D. Peak value

(xi) In parallel A.C circuit, at resonance, the current is:

A. Zero B. Maximum

C. Minimum D. Infinity

(xii) Amorphous solids are also called:

A. Crystalline solids B. Glassy solids

C. Abnormal solids D. Normal solids

(xiii) Good conductors have conductivities of the order of:

A. $10^{7}(\Omega m)^{-1}$ B. $10^{-10}(\Omega m)^{-1}$

C. $10^{4}(\Omega m)^{-1}$ D. $10^{-4}(\Omega m)^{-1}$

(xiv) Depletion region is constituted by:

A. Electrons B. Negative ions

C. Positive ions D. Negative and positive ions

(xv) In a certain circuit, the transistor has a collector current of 30 mA and base current of $30\mu A$.

The current gain of the transistor is:

A. 250 B. 1000

C. 357 D. 500

(xvi) Light is, in short, most refined form of:

A. Matter B. Energy

C. Waves D. Frequency

(xvii) The emission of photons by a metal when electrons are incident is called:

A. X-rays production B. Photoelectric effect

C. Pair production D. Compton effect

For Examiner's use only:

Total Marks:	17
Marks Obtained:	

25

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)

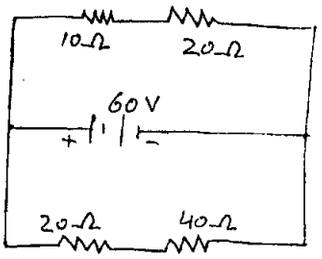
Q. 2 Answer any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines. (14 x 3 = 42)

(i) What is the difference between electrical potential energy and potential difference?

(ii) What do you understand by electric field lines?

(iii) Explain why the terminal potential difference of a battery decreases when the current drawn from it is increased?

(iv) A circuit is shown in the figure. Find the current through the 10 Ohm resistor and the equivalent resistance of the circuit.



(v) A charged particle enters in a region of magnetic field B. its velocity is perpendicular to the direction of the field. Find a relation for the time period of the revolution of the particle.

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

(vii) Which factors increase the induced current, when the induced EMF leads induced current in a closed circuit?

(viii) When an electric motor, such as an electric drill, is being used, does it also act as a generator? If so what is the consequence of this?

(ix) How does doubling the frequency affect the reactance of (a) an inductor (b) a capacitor?

(x) Write a note on superconductors.

(xi) Discuss the mechanism of electrical conduction by holes and electrons in a pure semi-conductor.

(xii) What do you mean by rectification?

(xiii) Why charge carriers are not present in the depletion region?

(xiv) If we keep applying force on a material object, can the object gain the speed of light? If not, why?

(xv) Describe NAVSTAR system.

(xvi) Can X-rays be reflected, refracted, diffracted and polarized just like any other waves? Explain.

(xvii) What are the advantages of lasers over ordinary light?

(xviii) How many protons, neutrons and electrons are there in the nucleus of ${}_{86}Rn^{222}$?

(xix) Name the groups in which sub-atomic particles are divided?

SECTION – C (Marks 26)

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

Q. 3 **a.** What is meant by a capacitor and its capacitance? Find an expression of the capacitance of a parallel plate capacitor. Describe the effect of dielectric on capacitance by placing it between the plates of a capacitor. **(2+4+1=07)**

b. A particle having a charge of 20 electrons on it falls through a potential difference of 100 volts. Calculate the energy acquired by it in electron volts (ev). **(04)**

c. Define the term relative permitivity. **(02)**

Q. 4 **a.** Derive an expression for the force on a charged particle moving in magnetic field. Also explain the direction of force on an electron and proton. **(4+1=05)**

b. A coil 0.1 mx0.1m and of 200 turns carrying a current of 1.0 mA is placed in a uniform magnetic field of 0.1T. Calculate the maximum torque that acts on the coil. **(04)**

c. Describe how e/m (charge to mass ratio) of an electron can be determined by projecting it perpendicular to magnetic field. **(04)**

Q. 5 **a.** Explain and derive an expression for the wavelength of the various spectral lines of hydrogen emission spectrum on the basis of Bohr's atomic theory. **(05)**

b. Find the wavelength of the spectral line corresponding to the transition in hydrogen from n=6 to n=3 state. **(04)**

c. How did de-Broglie deduce Bohr's second postulate? **(04)**