

Roll No. 

(To be filled in by the candidate)

**Physics****HSSC (12<sup>th</sup>)1<sup>st</sup> Annual-2023****Time : 20 Minutes****Paper : II****Group : I****Objective – (iii)****Marks : 17**

SWL-12-1-23

Paper Code 

8	4	7	5
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**Note:** - You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number in your answer book. Use marker or pen to fill the circles. Cutting or filling up two or more circles will result no mark.

**SECTION-A**

Q.1	Questions	A	B	C	D
1.	In Helium-Neon Laser, the discharge tube is filled with:	80 % He	85 % He	90 % He	95 % He
2.	The quantity $\frac{h}{m_0c}$ has dimensions of:	Mass	Time	Length	Energy
3.	If the energy of a photon is E, then its rest mass is given as:	Infinity	Negative	Zero	Variable
4.	The mathematical notation for exclusive OR operation is:	$X = \overline{AB} + \overline{A}B$	$X = A+B$	$X = \overline{AB} + \overline{A}B$	$X = \overline{A} + \overline{B}$
5.	The output of an OR gate is '0' only when its:	Both inputs are '1'	Both inputs are '0'	Either input is '1'	Either input is '0'
6.	The forbidden energy gap of an insulator is of the order of:	5 eV	10 eV	2 eV	Several eV
7.	The ratio of the rms value of the applied voltage to the rms value of resulting A.C is:	Reactance	Resonance	Impedance	Conductance
8.	In three phase A.C. supply, coils are inclined at an angle of:	0°	90°	120°	180°
9.	When the back emf is zero, it draws:	Maximum current	Zero current	Steady current	Pulsating current
10.	Frequency of A.C. used in Pakistan is:	100 Hz	50 Hz	60 Hz	120 Hz
11.	The charge to mass ratio of neutron is:	Less than electron	Equal to electron	Greater than electron	Zero
12.	High resistance in voltmeter is given by:	$\frac{I_g R_g}{I - I_g}$	$\frac{I - I_g}{I_g}$	$\frac{V}{I_g} - R_g$	$I_g - \frac{R_g}{V}$
13.	Heat generated by a 40 watt bulb in one hour is:	4800 J	14400 J	144000 J	1440 J
14.	The negative of the electric potential gradient is:	Electric intensity	Electromotive force	Potential difference	Electric force
15.	Electric potential energy per unit electric potential is called:	Intensity	Flux	Current	Charge
16.	Electrons are:	Hadrons	Leptons	Quarks	Baryons
17.	The amount of energy equivalent to 1a.m.u is:	0.9315 MeV	9.315 MeV	93.15 MeV	931.5 MeV

Note: Section B is compulsory. Attempt any 3 questions from Section C.

**SECTION-B**

2. Write short answers to any Eight parts. (8 x 2 = 16)
- The potential is constant throughout a given region of space. Is electric field zero or non-zero in this region? Explain.
  - Suppose that you follow an electric field line due to positive point charge. Do electric field and potential, increase or decrease?
  - Why does the picture on a TV screen become distorted when magnet is brought near the screen?
  - Why the voltmeter should have a very high resistance?
  - What factors make a fusion reaction difficult to achieve?
  - A particle which produces more ionization is less penetrating. Why?
  - Why the capacitance of parallel plate capacitor rises in the presence of dielectric?
  - Differentiate between electric potential and electric potential difference.
  - What is the function of X and Y plates in CRO?
  - State ampere's law. Give its significance.
  - What do you mean by nuclear fission? Give example.
  - Charged particle  $\alpha$ ,  $\beta$  and  $\gamma$ -radiation produce fluorescence. Define fluorescence.
3. Write short answers to any Eight parts. (8 x 2 = 16)
- Do bends in a wire affect its electrical resistance?
  - Why does the resistance of a conductor rise with temperature?
  - Differentiate between resistance and resistivity. Give their units.
  - What is meant by A.M and F.M?
  - How many times per second will an incandescent lamp reach maximum brilliance when connected to 50 Hz source?
  - A sinusoidal current has rms value of 10 A. What is the maximum or peak value?
  - Distinguish between crystalline, amorphous and polymeric solids.
  - What is meant by para, dia and ferromagnetic substances? Give an example for each.
  - Define retativity and coercivity.
  - How does the motion of an electron in an n-type substance differ from the motion of holes in a p-type substance?
  - Why is the base current in a transistor very small?
  - Give four applications of photodiode.
4. Write short answers to any Six parts. (6 x 2 = 12)
- Does the induced emf always act to decrease the magnetic flux through a circuit?
  - In a certain region, the Earth's magnetic field points vertically down. When a plane flies due north, which wingtip is positively charged.
  - How can we increase the induced current?
  - What are the measurements on which two observers in relative motion will always agree upon?
  - What happens to the total radiation from a black body if its absolute temperature is doubled?
  - Differentiate between inertial and non-inertial frame of reference.
  - Show that no material object can be accelerated to the speed of light 'c' in free space.
  - Give different types of spectra with examples.
  - Is energy conserved when an atom emits a photon of light?

**SECTION-C**

Note:- Attempt any Three questions. Each question carries Eight (8) Marks. (8 x 3 = 24)

5. (a) What is the Wheatstone bridge? Write its principle. How is it used to determine the unknown resistance? 5  
 (b) 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 450 V, how many electrons have been transferred? ( $e = 1.6 \times 10^{-19} C$ ). 3
6. (a) Find an expression for the magnetic energy density of the solenoid. 5  
 (b) A solenoid 15.0 cm long has 300 turns of a wire. A current 5.0 A flows through it. What is the magnitude of magnetic field inside the solenoid? 3
7. (a) Draw RLC series resonant circuit. Derive resonance frequency. Write four properties of series resonance circuit. 5  
 (b) In the given circuit, 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  $\frac{I_c}{I_E}$ , if the value of current gain  $\beta$  is 100. 3
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8. (a) Define strain energy. Derive a relation for strain energy in deformed materials. 5  
 (b) What is the maximum wave length of the two photons produced when a positron annihilates an electron? The rest mass energy of each is 0.51 MeV. 3
9. (a) What is a nuclear reactor? Discuss the function of its main parts. 1+4= 5  
 (b) The wave length of K X-ray from copper is  $1.377 \times 10^{-10} m$ . What is the energy difference between the two levels from which this transition results? 3

**Physics****HSSC (12<sup>th</sup>) 1<sup>st</sup> Annual 2023**

Time : 20 Minutes

Paper : II

Group : II

Objective – (iv)

Marks : 17

SWL-12-2-23

Paper Code 

8	4	7	8
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Note: - You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number in your answer book. Use marker or pen to fill the circles. Cutting or filling up two or more circles will result no mark.

**SECTION-A**

Q.1	Questions	A	B	C	D
1.	Normally an electron can reside in metastable state for about:	$10^{-3}s$	$10^{-4}s$	$10^{-5}s$	$10^{-8}s$
2.	In annihilation emitted photons move in opposite directions to conserve:	Mass	Energy	Momentum	Charge
3.	Numerical value of $\frac{h}{m_0c}$ is :	$2.43 \times 10^{-12}m$	$2.43 \times 10^{12}m$	$2.43 \times 10^{-19}m$	$2.43 \times 10^{19}m$
4.	A two inputs NAND gate with inputs A and B has an output zero-if:	A is zero	B is zero	Both A and B are zero	Both A and B are one
5.	The relation for gain of an inverting operational amplifier is:	$G = \frac{R_1}{R_2}$	$G = \frac{R_2}{R_1}$	$G = \frac{-R_2}{R_1}$	$G = \frac{-R_1}{R_2}$
6.	Young's modulus for Lead is:	$15 \times 10^9 Nm^{-2}$	$7.7 \times 10^9 Nm^{-2}$	$5.6 \times 10^9 Nm^{-2}$	$2.2 \times 10^9 Nm^{-2}$
7.	In three phase A.C. supply, the voltage across each of the lines and the neutral line is:	220 V	230 V	400 V	440 V
8.	The types of modulation are:	2	3	4	5
9.	In case of step up transformer:	$N_s < N_p$	$N_s > N_p$	$N_s = N_p$	$N_p = 0$
10.	Formula for self-inductance of the solenoid is:	$L = \mu_0 n A l$	$L = \mu_0 N A l$	$L = \mu_0 n^2 A l$	$L = \mu_0 N^2 A l$
11.	An ammeter is connected in a circuit in:	Perpendicular	Series	Antiparallel	Parallel
12.	The number of electrons in CRO is controlled by:	Grid	X-Deflecting plates	Y-Deflecting plates	Filament
13.	If there is no fourth band, tolerance is:	Zero	$\pm 5\%$	$\pm 10\%$	$\pm 20\%$
14.	The statement $\Phi_e = \frac{1}{\epsilon_0} \times Q$ was given by :	Faraday	Oersted	Gauss	Coulomb
15.	Electric flux does not depend upon:	Shape of closed surface	Charge	Charge and medium	Medium
16.	The amount of energy equivalent to 1 amu is:	9.315 MeV	93.15 MeV	931.5 MeV	9315 MeV
17.	The mass of a neutron is almost equal to mass of:	Electron	Proton	Photon	Phonon

Note: Section B is compulsory. Attempt any 3 questions from Section C.

**SECTION-B**

2. Write short answers to any Eight parts. (8 x 2 = 16)
- Find out an equation for determination of electric intensity due to a point charge.
  - Write down two properties of electric lines of force.
  - Describe the force or forces on a positive charge when placed between two plates.
    - with similar and equal charge
    - with opposite and equal charge
  - If a point charge 'q' of mass 'm' is released in a non-uniform electric field with field lines pointing in the same direction, will it make a rectilinear motion?
  - Is it possible to orient a current loop in a uniform magnetic field such that loop will not tend to rotate? Explain.
  - What should be the orientation of a current carrying coil in a magnetic field so that torque acting upon the coil is
    - maximum
    - minimum
  - Why is 'B' non zero outside a solenoid?
  - What are the factors upon which sensitivity of the galvanometer depends?
  - If someone accidentally swallows an  $\alpha$  source and a  $\beta$  source, which would be more dangerous to him. Explain it.
  - What do we mean by the term 'critical mass'?
  - Give two dangerous causes of ultraviolet radiation.
  - What is the role of a moderator in a nuclear reactor?

3. Write short answers to any Eight parts. (8 x 2 = 16)
- What are difficulties in testing whether the filament of a lighted bulb obeys Ohm's law?
  - Explain why the terminal potential difference of a battery decreases when the current drawn from it is increased?
  - A voltmeter is connected across the terminals of a cell in open circuit. Does it measure emf or terminal potential difference, Explain.
  - When 20 volts are applied to an A.C circuit having impedance of  $100\ \Omega$ , what will be current flowing?
  - How the reception of a particular radio station is selected on your radio set?
  - In a R-L circuit, will the current lag or lead the voltage? Illustrate your answer by vector diagram.
  - Explain, why a material with high retentivity and large coercive force is suitable for permanent magnet?
  - Does basic crystalline structure change with doping in semiconductor? Explain with diagram.
  - What is meant by strain energy? Which method is suitable to determine this energy?
  - What is the net charge on an n-type or a p-type substance?
  - The anode of a diode is 0.2V positive with respect to its cathode. Is it forward biased?
  - What is meant by open loop gain of an operational amplifier?

4. Write short answers to any Six parts. (6 x 2 = 12)
- What is the back emf effect in a motor?
  - Show that  $\varepsilon$  and  $\frac{\Delta\Phi}{\Delta t}$  have the same units.
  - Can a D.C motor be turned into a D.C generator? What changes are required to be done?
  - What are the measurements on which two observers in relative motion will always agree upon?
  - Why don't we observe a Compton effect with visible light?
  - What is the advantage of "NAVSTAR" navigations system?
  - How does  $K_{\alpha}$  X-rays differ from  $K_{\beta}$  X-rays?
  - Find the speed of the electron in the first Bohr orbit?
  - Can the electron in the ground state of hydrogen absorb a photon of energy 13.6 eV and greater than 13.6 eV?

**SECTION-C**

Note:- Attempt any Three questions. Each question carries Eight (8) Marks (8 x 3=24)

- Define emf and terminal potential difference. Derive a relation between them. Interpret the equation  $E=IR+Ir$  also. (1+3+1) = 5
- Two point charges,  $q_1 = -1 \times 10^{-6} C$  and  $q_2 = +4 \times 10^{-6} C$  are separated by a distance of 3m. Find and justify the zero-field location. 3
- State Ampere's law. Write its mathematical form and apply it to find the magnetic field inside the solenoid. 5
- Two coils are placed side by side. An emf of 0.8V is observed in one coil when the current is changing at the rate of  $200\text{ As}^{-1}$  in the other coil. What is the mutual inductance of the coils? 3
- Describe the behaviour of A.C signal through an inductor with vector diagram and graphical representation. 5
- In the given circuit, there is negligible potential drop between B and E. if  $\beta=100$ , then calculate, (i) base current (ii) collector current. 3
- What is doping? Explain formation of n-type and p-type semiconductor. 5
- What is the mass of a 70 kg man in a space rocket travelling at 0.8C from us as measured from Earth? 3
- What are continuous x-rays inner shell transition? Describe the properties and use of x-rays. 5
- If  ${}^{238}_{92}\text{U}$  decays twice by  $\alpha$ -emission, what is the resulting isotope? 3

