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.	Power factor in resistive circuit when A.C is passing will be:	Zero	1	$\frac{1}{\sqrt{2}}$	1
2.	Power dissipation in pure inductor circuit over the cycle is:	VI	$VI\cos\theta$	$\frac{V^2}{R}$	Zero
3.	The number of different crystal systems based on the geometrical arrangement of their atoms is:	5	7	4	9
4.	A photo diode can turn its current ON and OFF in:	Nano second	Milli second	Seconds	100 second
5.	Current gain of transistor is of the order of:	Decimal	Hundreds	Thousands	10
6.	Energy of a photon is independent of:	Intensity of light	Frequency of light	Wavelength of light	Velocity of light in a medium
7.	Photoelectric effect is explained by considering light as:	Electromagnetic waves	Corpuscles	Wave front having energy	Simple waves
8.	Energy of electron in the infinite orbit of hydrogen atom is:	13.2 eV	−13.2 eV	3.4 eV	Zero
9.	Size of quark is of the order of:	Less than $10^{-15}\,m$	Less than $10^{-10}\,m$	Less than $10^{-9}\,m$	Less than $10^{-18}\,m$
10.	It is very difficult to dispose off radioactive waste due to:	Long half life	High energy	Uncontrolled chain reaction	Fast chemical reaction
11.	Efficiency of practical transformer is less than ideal one due to:	Eddy current	High current	Low current	Low voltage
12.	VSA^{-1} is called:	Joule	Watt	Henry	Newton
13.	A one coulomb charge of mass one gram is in electric field of $1NC^{-1}$, acceleration will be:	$100\,ms^{-2}$	$1000\,ms^{-2}$	$1\,ms^{-2}$	$10\,ms^{-2}$
14.	Magnetic flux through area $5m^2\hat{k}$ due to magnetic field $3\hat{i}+2\hat{j}$ tesla is:	15 Wb	10 Wb	30 Wb	Zero
15.	A wire of length l and resistance R is cut into three equal pieces and twisted. Equivalent resistance will be:	R	$\frac{R}{3}$	$\frac{R}{9}$	$\frac{R}{4}$
16.	Shape of Gaussian surface should be:	Closed	Spherical	Circular	Box type
17.	Toner is given:	Positive charge	Negative charge	Conventional current	No charge

307-422-A-11900   ★★★★

Physics   H.S.S.C (12th)-A-2022   Time : 2:40 Hours

Paper : II   Group : I   Subjective   Sial-G1-22 Marks : 68

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)

   i. What are the factors upon which electric flux depend?

   ii. Define Electron Volt. Prove that $1eV = 1.6 \times 10^{-19} J$.

   iii. Suppose that you follow an electric field line due to a positive point charge. Do electric field and the potential increase or decrease?

   iv. Do electron tend to go to the region of high potential or low potential?

   v. Can an electron at rest be set in motion with a magnet?

   vi. How can you use a magnetic field to separate isotopes of chemical element?

   vii. If a charge particle moves in a straight line through some region of space, can you say that magnetic field in that region is zero?

   viii. Write down main parts of CRO.

   ix. What are Hardons and Leptons? Explain with examples.

   x. What is meant by dose of radiation? Give its unit.

   xi. If someone accidently swallows an α−source and β−source which would be more dangerous to him? Explain why?

   xii. A particle which produces more ionization is less penetrating. Why?

3. **Write short answers to any Eight parts.**   (8 x 2 = 16)

   i. Distinguish between the conventional current end electronic current.

   ii. How can you use a rheostat as a variable resistor in a circuit?

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

   iv. An AC voltmeter reads 250V. What is its peak value?

   v. Define Modulation with its types.

   vi. How many times per second will an incandescent lamp reach maximum brilliance when connected to a 50Hz source?

   vii. Define Curie Temperature. What is curie temperature for iron?

   viii. Differentiate between donor atoms and acceptor atoms.

   ix. Define the terms   (a) Elastic limit   (b) Yield point

   x. Define Logic Gates.

   xi. Why ordinary silicon diodes do not emit light?

   xii. The base current in a transistor is very small. Why?

4. **Write short answers to any Six parts.**   (6 x 2 = 12)

   i. 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?

   ii. Does the induced emf always act to decrease the magnetic flux through a circuit?

   iii. Write two methods for determining the induced emf in a loop.

   iv. State Faraday's law of electromagnetic induction and write its mathematically expression.

   v. What happens to total radiation from a black body if its absolute temperature is doubled?

   vi. Why do not we observe a Compton effect with visible light?

   vii. Distinguish between general and special theory of relativity?

   viii. Distinguish between stimulated and spontaneous emission.

   ix. What is meant by line spectrum? Explain how line spectrum can be used for identification of elements?

SECTION–C
(Each question carries Eight (8) Marks)

5. (a) What is Wheatstone bridge? How it can be used to find the unknown resistance?   5

   (b) A particle having a charge of 20 electrons on it falls through the potential difference of 100 volts. Calculate the energy acquired by it in electron volt (e V).   3

6. (a) Describe how charge to mass (e/m) ratio of an electron can be determined by projecting it perpendicular to a magnetic field.   5

   (b) 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 $200\,As^{-1}$ in the other coil. What is the mutual inductance of the coils?   3

7. (a) Describe the A.C through a R-C series circuit.   5

   (b) Calculate gain of non-investing amplifier as shown in given figure.   3
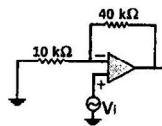
8. (a) Define Compton Effect. Find the expression for Compton shift. Draw its scattering diagram and label it.   5

   (b) 1.25cm diameter cylinder is subjected to a load of 2500 Kg. Calculate the stress on the bar in mega pascals.   3

9. (a) What is nuclear fission? Explain fission chain reaction in detail.   5

   (b) The wavelength 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

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.	Photons emitted in inner shell transition are:	Continuous X-rays	Discontinuous X-rays	Characteristics X-rays	Energetic X-rays
2.	The value of Wien's constant is:	$2.9\times10^{-3}\,mk$	$2.9\times10^{3}\,mk$	$2.9\times10^{-5}\,mk$	$2.9\times10^{5}\,mk$
3.	Platinum wire becomes yellow at a temperature of:	900°C	500°C	1100°C	1300°C
4.	A device which used for the conversion of A.C into D.C is called:	An oscillator	Detector	An amplifier	Rectifier
5.	The value of potential barrier for Silicon at room temperature is:	0.3 V	0.7 V	0.5 V	0.9 V
6.	The S.I unit of stress is same as that of:	Force	Pressure	Momentum	Work
7.	The mean value of A.C is:	1	0	I_0	$\dfrac{I_0}{\sqrt{2}}$
8.	At high frequency the value of reactance of a capacitor in A.C circuit will be:	Small	Zero	Large	Infinite
9.	Energy density in inductor is given by:	$\dfrac{1}{2}\dfrac{B}{\mu_o}$	$\dfrac{1}{2}\dfrac{B}{\mu_{o^2}}$	$\dfrac{1}{2}\dfrac{B^2}{\mu_{o^2}}$	$\dfrac{1}{2}\dfrac{B^2}{\mu_o}$
10.	The application of mutual induction is a:	D.C motor	Radio	Television	Transformer
11.	Torque is produced in a current carrying coil when it is placed in a:	Electric field	Magnetic field	Gravitational field	Nuclear field
12.	Which one has least resistance?	Galvanometer	Ammeter	Voltmeter	Ohmmeter
13.	When a charge of $5\mu C$ passes through a conductor in 2 sec. the current in conductor is:	10A	2.5A	$2.5\,mA$	$2.5\mu A$
14.	The electric intensity due to an infinite sheet of positive charge is:	$E=\dfrac{\delta}{2\varepsilon_0}$	$E=\dfrac{\delta}{\varepsilon_0}$	$E=\dfrac{2\delta}{\varepsilon_0}$	$E=\dfrac{1}{2\delta\varepsilon_0}$
15.	Which one is photoconductor?	Copper	Selenium	Mercury	Aluminium
16.	Half life of Uranium –239 is:	26.5 minutes	24.5 minutes	25.5 minutes	23.5 minutes
17.	The binding energy per nucleon is maximum for:	Helium	Iron	Polonium	Radium

Physics   **H.S.S.C (12ᵗʰ)-A-2022**   Time : 2:40 Hours

Paper : II   Group : II   Subjective ~~Swl-92-2~~ Marks : 68

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)**

  i. What is the function of drum in photocopier?
  ii. Prove that electric intensity and potential gradient has same unit.
  iii. Do electrons tend to go to region of high potential or of low potential?
  iv. Electric lines of force never cross. Why?
  v. How direction of magnetic field is determined in a current carrying long wire?
  vi. Prove that $NA^{-1}m^{-1} = Wbm^{-2}$. Justify your answer.
  vii. Why the resistance of an ammeter should be very low?
  viii. Is it possible to orient a current loop in a uniform magnetic field such that the loop will not tend to rotate?
  ix. Which radiation dose would deposit more in the body (a) 10mGy to hand or (b) 1mGy to entire body?
  x. What do you understand by background radiation? Write two sources of these radiation.
  xi. What will be the charge on bottom, bottom and bottom quark combination baryon?
  xii. Differentiate between thermal and fast reactors.

3. **Write short answers to any Eight parts.**   **(8 x 2 = 16)**

  i. A potential difference is applied across the ends of a copper wire. What will be effect on the drift velocity of free electrons by (a) increasing potential (b) decreasing the length and the temperature of the wire?
  ii. Why does the resistance of a conductor rise with temperature?
  iii. Differentiate between the terminal potential and emf on the basis of open and closed circuit.
  iv. How does doubling the frequency affect the reactance of (a) an inductor (b) a capacitor?
  v. What is meant by A.M and F.M?
  vi. A sinusoidal current has peak value of 14.14A. what will be its *rms* value?
  vii. Explain, why the ball comes to its original size when stress is removed?
  viii. Differentiate between steel and soft iron on the basis of hysteresis loop area.
  ix. Distinguish between crystalline, amorphous and polymeric solids.
  x. What is the net charge on n-type or a p-type substance?
  xi. Why the base current in a transistor is very small?
  xii. What are sensors? Explain how Light Dependent Resistance (LDR) works as sensor of light.

4. **Write short answers to any Six parts.**   **(6 x 2 = 12)**

  i. On what factors the self-inductance of a coil depends?
  ii. What is the principle of an electric generator?
  iii. Four unmarked wires emerge from a transformer. What steps should you take to determine the turns ratio?
  iv. How would you position a flat loop of wire in a changing magnetic field so that there is no emf induced in the loop?
  v. Why do not we observe Compton Effect with visible light?
  vi. Can pair production take place in vacuum? Explain.
  vii. State uncertainty principle.
  viii. How X-rays cause damage to living tissue?
  ix. How can the spectrum of Hydrogen contain so many lines when Hydrogen contains only one electron?

SECTION-C

(Each question carries Eight (8) Marks)

5.(a) Find the charge on an electron by Millikan's method.   5

(b) A rectangular bar of iron is 2cm by 2cm in cross-section and 40cm long. Calculate its resistance if the resistivity of iron is $11 \times 10^{-8} \Omega m$ 3

6. (a) Derive the expression for force on moving electric charge in a uniform magnetic field. Also determine its direction.   5

(b) A square coil of side 16cm has 200 turns and rotates in uniform magnetic field of magnitude 0.05T. If the peak emf is 12V. What is the angular velocity of the coil?   3

7. (a) How power is calculated in A.C circuit? Draw circuit diagram for RLC series resonating circuit. Discuss the behaviour of this circuit for A.C and also write down its properties.   5

(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.   3

8. (a) What is meant by strain energy? How can it be determined from force extension graph?   5

(b) Assuming you radiate as does a black body at your body temperature $37°C$. At what wavelength do you emit the most energy?   3

9. (a) Discuss the nuclear fission reaction in detail.   5

(b) Compute the shortest wavelength radiation in the Balmer series. What value of n must be used?   3