Roll No. | | | | | | | (To be filled in by the candidate)

Physics | **HSSC (12th) 1st Annual-2023** | **Time : 20 Minutes**

Paper : II | **Group : I** | **Objective – (iii)** | **Marks : 17**

SWL-12-1-23

Paper Code	8	4	7	5

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 $\frac{h}{m_o c}$ 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:	$X=A\bar{B}+\bar{A}B$	$X=\overline{A+B}$	$X=\overline{AB+AB}$	$X=\bar{A}+\bar{B}$
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

Roll No. | | | | | | | (To be filled in by the candidate)

Physics SWL-12-1-23 **HSSC (12th)1st Annual-2023** Time : 2:40 Hours

Paper : II | Group : I | Subjective | 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. The potential is constant throughout a given region of space. Is electric filed zero or non-zero in this region?Explain.
ii. Suppose that you follow an electric field line due to positive point charge. Do electric field and potential, increase or decrease?
iii. Why does the picture on a TV screen become distorted when magnet is brought near the screen?
iv. Why the voltmeter should have a very high resistance?
v. What factors make a fusion reaction difficult to achieve?
vi. A particle which produces more ionization is less penetrating. Why?
vii. Why the capacitance of parallel plate capacitor rises in the presence of dielectric?
viii. Differentiate between electric potential and electric potential difference.
ix. What is the function of X and Y plates in CRO?
x. State ampere's law. Give its significance.
xi. What do you mean by nuclear fission? Give example.
xii. Charged particle α, β and γ-radiation produce fluorescence. Define fluorescence.

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

i. Do bends in a wire affect its electrical resistance?
ii. Why does the resistance of a conductor rise with temperature?
iii. Differentiate between resistance and resistivity. Give their units.
iv. What is meant by A.M and F.M?
v. How many times per second will an incandescent lamp reach maximum brilliance when connected to 50 Hz source?
vi. A sinusoidal current has rms value of 10 A. What is the maximum or peak value?
vii. Distinguish between crystalline, amorphous and polymeric solids.
viii. What is meant by para, dia and ferromagnetic substances? Give an example for each.
ix. Define retantivity and coercivity.
x. How does the motion of an electron in an n-type substance differ from the motion of holes in a p-type substance?
xi. Why is the base current in a transistor very small?
xii. Give four applications of photodiode.

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

i. Does the induced emf always act to decrease the magnetic flux through a circuit?
ii. In a certain region, the Earth's magnetic field points vertically down. When a plane flies due north, which wingtip in positively charged.
iii. How can we increase the induced current?
iv. What are the measurements on which two observers in relative motion will always agree upon?
v. What happens to the total radiation from a black body if its absolute temperature is doubled?
vi. Differentiate between inertial and non-inertial frame of reference.
vii. Show that no material object can be accelerated to the speed of light 'c' in free space.
viii. Give different types of spectra with examples.
ix. 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

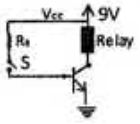
(b) A capacitor has a capacitance of $2.5\text{x}10^{-4} F$. In the charging process, electrons are removed from one plate and placed on the other one. When the potential difference between the plates is 450 V, how many electrons have been transferred? ($e = 1.6\text{x}10^{-19}\text{C}$). 3

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 μA. 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 β is 100. 3



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 $1.377\text{x}10^{-10}$m. What is the energy difference between the two levels from which this transition results? 3

Roll No. | | | | | | | (To be filled in by the candidate)

Physics | **HSSC (12th) 1st Annual 2023** | Time : 20 Minutes

Paper : II | Group : II | Objective – (iv) | Marks : 17

SWL-12-2-23 | Paper Code | 8 | 4 | 7 | 8 |

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 $\frac{h}{m_o c}$ 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:	$L = \mu_0 nAl$	$L = \mu_0 NAl$	$L = \mu_0 n^2 Al$	$L = \mu_0 N^2 Al$
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	±5%	±10%	±20%
14.	The statement $\Phi_e = \frac{1}{\varepsilon_o} \times Q$ 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

Roll No. | | | | | | | (To be filled in by the candidate)

Physics SWL-12-2-23 **HSSC (12th)1st Annual-2023** Time : 2:40 Hours

Paper : II | Group : II | Subjective | 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. Find out an equation for determination of electric intensity due to a point charge.
ii. Write down two properties of electric lines of force.
iii. Describe the force or forces on a positive charge when placed between two plates.
(a) with similar and equal charge (b) with opposite and equal charge
iv. 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?
v. Is it possible to orient a current loop in a uniform magnetic field such that loop will not tend to rotate? Explain.
vi. What should be the orientation of a current carrying coil in a magnetic field so that torque acting upon the coil is
(a) maximum (b) minimum
vii. Why is 'B' non zero outside a solenoid?
viii. What are the factors upon which sensitivity of the galvanometer depends?
ix. If someone accidently swallows an α source and a β source, which would be more dangerous to him. Explain it.
x. What do we mean by the term 'critical mass'?
xi. Give two dangerous causes of ultraviolet radiation.
xii. What is the role of a moderator in a nuclear reactor?

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

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

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

i. What is the back emf effect in a motor?
ii. Show that ε and $\frac{\Delta\Phi}{\Delta t}$ have the same units.
iii. Can a D.C motor be turned into a D.C generator? What charges are required to be done?
iv. What are the measurements on which two observers in relative motion will always agree upon?
v. Why don't we observe a Compton effect with visible light?
vi. What is the advantage of "NAVSTAR" navigations system?
vii. How does K_α X-rays differ from K_β X-rays?
viii. Find the speed of the electron in the first Bohr orbit?
ix. 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)

5.(a) Define emf and terminal potential difference. Derive a relation between them. Interpret the equation E=IR+Ir also. **(1+3+1) =** **5**

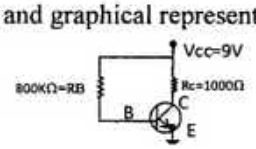
(b) Two point charges, $q_1 = -1x10^{-6}C$ and $q_2 = +4x10^{-6}C$ are separated by a distance of 3m. Find and justify the zero-field location. **3**

6.(a) State Ampere's law. Write its mathematical form and apply it to find the magnetic field inside the solenoid. **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 behaviour of A.C signal through an inductor with vector diagram and graphical representation. **5**

(b) In the given circuit, there is negligible potential drop between B and E. if β=100, then calculate, (i) base current (ii) collector current. **3**



8.(a) What is doping? Explain formation of n-type and p-type semiconductor. **5**

(b) What is the mass of a 70 kg man in a space rocket travelling at 0.8C from us as measured from Earth? **3**

9.(a) What are continuous x-rays inner shell transition? Describe the properties and use of x-rays. **5**

(b) If $^{233}_{92}U$ decays twice by α-emission, what is the resulting isotope? **3**

Roll No. [ ] (To be filled in by the candidate)

Physics

Paper : II Group : I

Px-II

H.S.S.C (12th)-A-2022

Objective – (iv)

Time : 20 Minutes

Marks : 17

Paper Code | 8 | 4 | 7 | 7 |

P Swl-91-22

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	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$
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

Roll No. | | | | | | | (To be filled in by the candidate)

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

Paper : II | Group : I | Subjective Sw.L-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 $1eV = 1.6\times10^{-19}J$.
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 $\alpha-$source and $\beta-$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 determing 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

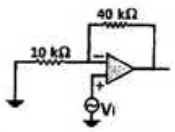
(b) A particle having a charge of 20 electrons on it falls through the potential difference of 100 volts. Calculate the energy acquired by it in electron volt (eV). 3

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 $200As^{-1}$ 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 $1.377\times10^{-10}m$. What is the energy difference between the two levels from which this transition results? 3

Roll No. | | | | | | | (To be filled in by the candidate)

Physics | H.S.S.C (12th)-A-2022 | Time : 20 Minutes

Paper : II | Group : II | Objective – (iv) | Marks : 17

Px-III | Paper Code | 8 | 4 | 7 | 8 | SWL-92-22

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:	I	0	I_0	$\frac{I_0}{\sqrt{2}}$
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:	$\frac{1}{2}\frac{B}{\mu_o}$	$\frac{1}{2}\frac{B}{\mu_o^2}$	$\frac{1}{2}\frac{B^2}{\mu_o^2}$	$\frac{1}{2}\frac{B^2}{\mu_o}$
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:	$E=\frac{\delta}{2\varepsilon_0}$	$E=\frac{\delta}{\varepsilon_0}$	$E=\frac{2\delta}{\varepsilon_0}$	$E=\frac{1}{2\delta\varepsilon_0}$
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

Roll No. | | | | | | | (To be filled in by the candidate)

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

Paper : II | Group : II | Subjective | 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 $11\times10^{-8}\Omega m$ **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 $37^{\circ}C$. 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**

Roll No. | | | | | | | (To be filled in by the candidate)

Physics | Inter (Part-II)-A-2021 | Time : 20 Minutes

Paper : II | Objective – (II) | Marks : 17

| Paper Code | 8 | 4 | 7 | 3 |

SWL-21

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.

Q.1	Questions	A	B	C	D
1.	For an inductor connected to an A.C. source, the applied voltage:	leads the current	is in phase with current	lags the current	changes independently
2.	The power dissipated in A.C. circuit is given by $P = I_{rms} \times V_{rms} \cos\theta$, in this relation $\cos\theta$ is called:	phase factor	gain factor	loss factor	power factor
3.	The curie temperature for iron is about:	$100^\circ C$	$750^\circ C$	$900^\circ C$	$1150^\circ C$
4.	The reverse current through a semiconductor diode is due to flow of:	holes	electrons	majority carriers	minority carriers
5.	A light emitting diode emits light only when it is:	OFF	reverse biased	forward biased	unbiased
6.	Momentum of photon is given by:	$\frac{h\lambda}{c}$	$\frac{f\lambda}{c}$	$\frac{hf}{c}$	$\frac{hf}{\lambda}$
7.	Compton shift equals the Compton wavelength, if the scattered X-ray photons are observed at:	180°	90°	60°	45°
8.	Orbital angular momentum of an electron in the allowed stationary orbit of hydrogen atom is given by:	$\frac{nh}{2\pi}$	$\frac{2h}{n\pi}$	$\frac{2\pi}{nh}$	$\frac{2n}{\pi h}$
9.	The unit of decay constant is:	m	S^{-1}	m^{-1}	S
10.	Total number of quarks is:	3	4	5	6
11.	Self inductance of a solenoid having length "l" number of turns per unit length "n" and area of cross-section "A" is given by:	$n^2 Al$	$\mu_o n Al$	$\mu_o n^2 Al$	$\mu_o n A^2 l$
12.	One henry is equal to:	$Vs^{-1}A^{-1}$	$Vs^{-1}A$	VsA	$Vs\,A^{-1}$
13.	When a charged particle is projected at right angle to the magnetic field, the magnitude of the magnetic force on charged particle is:	infinite	maximum	zero	negligible
14.	The value of permeability of free space is:	$4\times10^{-7}\ Wb\,A^{-1}m^{-1}$	$4\times10^{7}\ Wb\,A^{-1}m^{-1}$	$4\pi\times10^{-7}\ Wb\,A^{-1}m^{-1}$	$4\pi\times10^{7}\ Wb\,A^{-1}m^{-1}$
15.	SI unit of conductivity is:	$mho\ m^{-1}$	Siemen	$\Omega\,m$	$\Omega\,K^{-1}$
16.	A capacitor is a device that can:	generate charge	store charge	neutralize charge	burn charge
17.	Electric flux through a surface enclosing a charge depends on:	charge only	medium only	shape of closed surface	medium and charge enclosed

Note: **Section I is compulsory. Attempt any 3 questions from Section II.**

(SECTION-I)

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

i. Is it true that Gauss's law states that the total number of lines of forces crossing any closed surface in the outward direction is proportional to the net positive charge enclosed within surface?
ii. Define the term time constant.
iii. How can you identify that which plate of a capacitor is positively charged?
iv. Sketch the graphs for charging and discharging of a capacitor.
v. Is it possible to orient a current loop in a uniform magnetic field such that loop will not tend to rotate? Explain.
vi. Suppose that a charge q is moving in a uniform magnetic field with a velocity V. Why is there no work done by the magnetic force that acts on the charge q ?
vii. Discuss the extension of right hand rule to find the direction of magnetic force on a current carrying conductor.
viii. What is the working principle of "CRO"?
ix. Does the induced *emf* always act to decrease the magnetic flux through a circuit?
x. Define Faraday's law and Lenz's law.
xi. In a certain region the earth's magnetic field point vertically down. When a plane flies due north, which wingtip is positively charged?
xii. Name the factors upon which the self inductance depends.

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

i. What is Wheatstone bridge? How can it be used to determine an unknown resistance?
ii. Why does the resistance of conductor rise with temperature?
iii. State Kirchhoff's current and voltage rule.
iv. Name the device that will permit flow of alternating current but not the direct current.
v. How many times per second will an incandescent lamp reach maximum brilliance when connected to a 50 Hz source?
vi. Define impedance and write its unit.
vii. What is meant by strain energy? How can it be determined from the force-extension graph?
viii. Write a short note on superconductors.
ix. Define elastic limit and yield point.
x. Why a photo diode is operated in reverse biased state?
xi. Why is the base current in a transistor very small?
xii. What is the principle of virtual ground?

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

i. What is condition for pair production?
ii. Give two statements of uncertainty principle and write its mathematical forms.
iii. If an electron and a proton have the same de Broglie wavelength, which particle has greater speed?
iv. What is the biological effect of X-rays?
v. What do you mean when we say that atom is excited?
vi. Define mass defect and binding energy.
vii. Show that $1u = 931 MeV$
viii. A particle which produces more ionization is less penetrating. Why?
ix. Why heavy nuclei are unstable?

(SECTION-II)

(Each question carries Eight (8) Marks)

5. (a) Describe the experiment for determination of charge on an electron by Millikan's oil drop method. **5**
(b) The resistance of an iron wire at $0^\circ C$ is $1\times10^4\Omega$. What is the resistance at $500^\circ C$, if the temperature coefficient of resistance of iron is $5.2\times10^{-3}K^{-1}$? **3**

6. (a) Explain construction, working and uses of Cathode Ray Oscilloscope. **5**
(b) A metal rod of length 25cm is moving at the speed of $0.5 ms^{-1}$ in the direction perpendicular to a 0.25 T magnetic field. Find the *emf* produced in the rod. **3**

7. (a) Explain transistor as an amplifier and derive a relation for its gain. **5**
(b) Find the value of the current flowing through a capacitance $0.5\mu F$ when connected to a source of 150 V at 50 Hz. **3**

8. (a) Explain energy band theory of solids. How does it help to distinguish between conductors, insulators and semiconductors? **5**
(b) If $^{233}_{92}U$ decays twice by α-emission, what is the resulting isotope? **3**

9. (a) What is inner shell transitions? Explain the production of X-rays. **5**
(b) What is the de Broglie wavelength of an electron whose kinetic energy is 120 eV? **3**

SWL-12-19

Roll No._____ Annual 2019

Physics (New Scheme) (INTER: PART - II - CLASS 12th)(III) **Time : 20 Minutes**

Paper : II **Marks : 17**

Objective Code : 8475

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 with marker or pen. Cutting or filling two or more circles will result in zero mark in that question.

1. 1. Frequency range in FM is:

(A) 540 KHz to 1600 KHz (B) 1000 KHz to 1600 KHz (C) 540 MHz to 1600 MHz (D) 88 MIz to 108 MHz

2. Yttrium barium copper oxide ($YBa_2Cu_3O_7$) is superconductor at temperature:

(A) 163 K (B) 77 K (C) 4.2 K (D) 125 K

3. If $R_1 = 10k\Omega$ and $R_2 = 100k\Omega$, then gain of inverting amplifier is :

(A) - 11 (B) -10 (C) [illegible] (D) 11

4. A p-n junction cannot be us[illegible]

(A) amplifier (B) rectifier (C) [illegible] (D) LED

BLANK

5. The angle of scattering for which the Compton shift is maximum is :

(A) 180° (B) 90° (C) 45° (D) 0°

6. If temperature is doubled for a black body, then energy radiated per second per unit area becomes:

(A) $\frac{1}{2}$ times (B) $\frac{1}{4}$ times (C) $\frac{1}{16}$ times (D) 16 times

7. In spectrum of hydrogen, bracket series lies in :

(A) ultraviolet region (B) visible region (C) infrared region (D) X-rays region

8. Half life of radium-226 is:

(A) 1620 years (B) 3.8 days (C) 2.5 days (D) 23.5 minutes

9. Binding energy per nucleus is maximum for:

(A) Helium (B) Iron (C) Radium (D) Polonium

10. The number of electrons in one coulomb charge are equal to:

(A) 1.6×10^{-19} (B) 6.02×10^{-18} (C) 6.25×10^{20} (D) 6.25×10^{18}

11. What is the force on a proton placed between two parallel plates containing equal positive charges:

(A) zero (B) $2.6\times10^{-19}N$ (C) $9\times10^{-19}N$ (D) $5\times10^{-19}N$

12. A resistor of resistance 'R' is cut into two equal parts of resistance R/2 , its resistivity becomes:

(A) half (B) remains same (C) double (D) four times

13. Magnetic field of 0.5 T is parallel to vector area of $1m^2$ of a coil, flux through the coil is :

(A) zero (B) 5 web (C) 0.2 web (D) 0.5 web

14. The brightness of spot in CRO is controlled by:

(A) cathode (B) anode (C) grid (D) deflecting plates

15. The principle of an electric generator is based upon:

(A) Ampere's law (B) Faraday's law (C) Coulomb's law (D) Kirchhoff's law

16. Energy stored in the inductor is in the form of :

(A) electrical energy (B) magnetic energy (C) kinetic energy (D) chemical energy

17. In a three phase A.C generator, if the phase of first coil is 0° , then the phase of other two coils will be:

(A) 120° and 120° (B) 120° and 160° (C) 120° and 240° (D) 120° and 360°

SWL-12-P

Roll No. _____ Annual 2019

Physics (New Scheme) **(INTER PART - II – CLASS 12th)** **Time : 2 . 40 Hours**

Paper : II **SUBJECTIVE** **Marks : 68**

Note:- Section I is compulsory. Attempt any 3 questions from Section II.

(Section – I)

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

i. A particle carrying a charge of 2 e falls through a potential difference of 3.0 V. Calculate the energy acquired by it.
ii. Write four properties of electric field lines.
iii. How can you identify that which plate of a capacitor is positively charged?
iv. Do electrons tend to go to region of high potential or of low potential?
v. State Ampere's Law and write its formula.
vi. Define Lorentz force and write its equation.
vii. Why does the picture on a T.V screen become distorted when a magnet is brought near the screen?
viii. Why the resistance of an ammeter should be very low?
ix. State Faraday Law of electromagnetic induction.
x. Define the term Henry.
xi. Does the induced e.m.f always act to decrease the magnetic flux through a circuit?
xii. Show that ε and $\frac{\Delta\phi}{\Delta t}$ have the same units.

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

i. How many electrons pass through an electric bulb in one minute if the 300 mA current is passing through it?
ii. Define drift velocity and also write its value at room temperature.
iii. What are the difficulties in testing whether the filament of a lighted bulb obeys Ohm's Law?
iv. What is the principle of generation of electromagnetic waves?
v. Name the device that will (a) permit flow of direct current but oppose the flow of alternating current (b) Permit flow of alternating current but not the direct current.
vi. A choke coil placed in series with an electric lamp in an A.C circuit causes the lamp to become dim. Why is it so? A variable capacitor added in series, in this circuit may be adjusted until the lamp glows with normal brilliance. Explain how this is possible.
vii. What do you mean by hysteresis and hysteresis loss?
viii. How would you obtain N-type and P-type material from pure silicon? Illustrate it by schematic diagram.
ix. What do you mean by curie temperature? Write the curie temperature of iron.
x. The anode of a diode is 0.2 v positive with respect to its cathode. Is it forward biased?
xi. Why a photo diode is operated in reverse biased state?
xii. What do you mean by the terms, rectifier and rectification?

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

i. Why don't we observe a Compton effect with visible light?
ii. As a solid is heated and begins to glow. Why does it first appear red?
iii. What is the condition of pair production? Briefly explain.
iv. What are the advantages of lasers over ordinary light:
v. What is meant by CAT – Scanner?
vi. What do we mean by critical mass?
vii. What fraction of a radioactive sample decays after two half – lives have elapsed?
viii. What is the use of nuclear reactor and draw its diagram.
ix. Define decay constant and write its unit.

(Section - II)

Note Attempt any three (3) questions: (3 × 8=24)

5. (a What is Wheatstone Bridge? How it is used to determine the unknown resistance? (5)
(b A particle having a charge of 20 electrons on it falls through a potential difference of 100 volt. Calculate the energy acquired. **(3)**

6. (a Derive the expression for torque on the current carrying coil in uniform magnetic field. (5)
(b A square coil of side 16 cm has 200 turns and rotates in uniform magnetic field of magnitude 0.05 T, If the peak e.m.f is 12 v, what is the angular velocity of the coil? (3)

7. (a What is operational amplifier? Derive the relation for the gain of an inverting amplifier. (5)
(b A 10 mH, 20Ω coil is connected across 240 v and $180/\pi$ Hz source. How much power does it dissipate? (3)

8. (a State the special theory of relativity with two postulates and explain any two results. (5)
(b A steel wire 12 mm in diameter is fastened to a log and is then pulled by tractor. The length of steel wire between the log and tractor is 11m. A force of 10000 N is required to pull the log. Calculate (a) the stress in the wire and (b) the strain in the wire ($E = 200\times10^9\, Nm^{-2}$) (c) How much does the wire stretch when the log is pulled. (3)

9. (a State postulates of Bohr's model of the hydrogen atom and then show that hydrogen atom has quantized radii. (5)
(b A sheet of lead 5.0 mm thick reduces the intensity of a beam of γ – rays by a factor 0.4. Find half value thickness of lead sheet which will reduce the intensity to half of its initial value. (3)