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:	$Vs^{-1}A^{-1}$	$Vs^{-1}A$	$Vs\,A$	$Vs\,A^{-1}$
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

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hysics | Inter (Part-II)-A-2021 | Time : 2:40 Hours

Paper : II | Subjective SWL-21 | 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. 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**