

**PHYSICS**  
**GROUP : FIRST**

**TIME: 20 MINUTES**  
**MARKS: 17**

**OBJECTIVE**

D-12 - 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. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

**QUESTION NO. 1**

- |    |   |
|----|---|
| 1  | $\frac{\text{Second}}{\text{Ohm}}$ is equal to.<br>(A) Coulomb (B) Farad (C) Joule (D) Ampere   |
| 2  | S.I unit of electric flux is.<br>(A) $\text{N C}^{-1}$ (B) $\text{N.m}^2.\text{C}^{-1}$ (C) $\text{N.m.C}^{-1}$ (D) $\text{N.C}^{-1}.\text{m}^2$  |
| 3  | If there is a single black colour band around the body of a resistor, then the value of its resistance will be.<br>(A) Zero ohm (B) 10 ohm (C) 100 ohm (D) Infinity                             |
| 4  | If 300 turns of wire are wound on 30cm length, then number of turns per unit length is<br>(A) 10 (B) 20 (C) 100 (D) 1000  |
| 5  | Which of the following is not accurate potential measuring device ?<br>(A) Voltmeter (B) C.R.O (C) Potentiometer (D) Digital multimeter   |
| 6  | The rod of unit length is moving at $30^\circ$ through a magnetic field of 1T. If the velocity of rod is 1 m/s , then induced emf in the rod will be.<br>(A) 1 V (B) 0.25 V (C) 0.5 V (D) 0.6 V |
| 7  | In alternating current circuit, inductors behave like.<br>(A) Semi conductors (B) Resistors (C) Insulators (D) Conductors   |
| 8  | Resistance of pure choke is.<br>(A) Zero (B) Large (C) Very small (D) Infinite  |
| 9  | The device which allows only the flow of D.C. is.<br>(A) Capacitor (B) Transformer (C) Inductor (D) Generator   |
| 10 | Curie temperature for iron is.<br>(A) 1153 K (B) 1023 K (C) 750 K (D) 700 K   |
| 11 | If $R_1 = 10 \text{ k } \Omega$ and $R_2 = 100 \text{ k } \Omega$ , the gain of inverting amplifier is<br>(A) -11 (B) -10 (C) 10 (D) 11   |
| 12 | The open loop gain of op-amp is of the order of.<br>(A) $10^2$ (B) $10^3$ (C) $10^4$ (D) $10^5$   |
| 13 | 0.1 Kg is equivalent to the energy of.<br>(A) $9 \times 10^{15} \text{ J}$ (B) $9 \times 10^{16} \text{ J}$ (C) $6 \times 10^{16} \text{ J}$ (D) $3 \times 10^8 \text{ J}$                      |
| 14 | The rest mass energy of an electron positron pair is.<br>(A) 0.51 Mev (B) 1.02 Mev (C) 0.2 Mev (D) 1.51 Mev   |
| 15 | First spectral series of hydrogen atom was identified by.<br>(A) Lyman (B) Rydberg (C) Balmer (D) Paschen   |
| 16 | Slow neutrons can cause fission in.<br>(A) Uranium - 235 (B) Uranium - 238 (C) Neptunium (D) Lithium  |
| 17 | Radio therapy is generally done with $\gamma$ -rays emitted from.<br>(A) Sodium - 24 (B) Cobalt - 60 (C) Iodine - 131 (D) Strontium - 90  |

**QUESTION NO. 2 Write short answers any Eight (8) parts of the following**

16

i	The potential is constant throughout a given region of space. Is electric field zero or non zero in this region. Explain.
ii	Write any two comparisons of electric force and gravitational force.
iii	Calculate the electric intensity inside a hollow charged sphere.
iv	Electric lines of force never cross. Why ?
v	Write any two uses of C.R.O.
vi	Define current sensitivity of a galvanometer.
vii	Describe the change in magnetic field inside a solenoid carrying a steady current I, if length of solenoid is doubled and number of turns remains same.
viii	Why the resistance of ammeter should be very low ?
ix	Define nuclear reactor. Also write down its two main types of reactors.
x	Define fluorescence.
xi	Why are heavy nuclei unstable ? Explain briefly.
xii	Discuss the advantages and disadvantages of nuclear power as compared to the use of fossil fuel generated power.

**QUESTION NO. 3 Write short answers any Eight (8) parts of the following**

16

i	Why does the resistance of a conductor rise with temperature ?
ii	Differentiate between ohmic and non-ohmic devices with example.
iii	Give statements of Kirchhoff's, 1st rule and 2nd rule.
iv	A sinusoidal current has <i>rms</i> value of 10A. What is the maximum or peak value ?
v	What is Choke ? Why is it used in A.C. circuit ?
vi	What is impedance ? Give its SI Units.
vii	Distinguish between crystalline and amorphous solids.
viii	What is meant by hysteresis loss ?
ix	Why ordinary silicon diodes do not emit light ?
x	The anode of a diode is 0.2V positive with respect to the cathode. Is it forward biased ?
xi	Differentiate between Forward and Reverse Biasing.
xii	Define elastic limit and yield point.

**QUESTION NO. 4 Write short answers any Six (6) parts of the following**

12

i	Define motional emf and write its formula ?
ii	Explain the factors responsible for powers loss in transistor ?
iii	Four unmarked wires emerge from a transformer. What steps would you take to determine the turn ratio?
iv	Does the induced emf in a circuit depend on the resistance of the circuit ? Does the induced current depend upon the resistance of the circuit ?
v	Give four applications of photocell ?
vi	Define work function and threshold frequency.
vii	Define special theory of relativity and write its postulates ?
viii	Distinguish between stimulated and spontaneous emission ?
ix	What are the advantages of laser over ordinary light ?

**SECTION-II****Note: Attempt any Three questions from this section**

8 × 3 = 24

Q.5.(A)	Define capacitance of a capacitor. Derive an expression for the energy stored in the capacitor.	1+4
(B)	The resistance of an iron wire at 0 °C is $1 \times 10^4 \Omega$ . What is resistance at 500 °C of the temperature coefficient of resistance of iron is $5.2 \times 10^{-3} \text{ k}^{-1}$ .	3
Q.6.(A)	For a current carrying solenoid, derive expression for magnetic field. How can you explain the direction of magnetic field by right hand grip rule ?	5
(B)	An ideal step down transformer is connected with main supply of 240 V. It is desired to operate a 12 V, 30 W lamp. Find the current in the primary and the transformer ratio.	3
Q.7.(A)	What is the operational amplifier ? Derive the relation for gain of an inverting amplifier.	1+4
(B)	Find the capacitance required to construct a resonance circuit of frequency 1000 KHz with inductor of 5 mH.	3
Q.8.(A)	What is photoelectric effect ? How its results were explained by Einstein ?	1+4
(B)	A 2.5m long and cross-section area $10^{-5} \text{ m}^2$ is stretched 1.5 mm by a force of 100 N in the elastic region. Calculate (a) Strain (b) Young's modulus.	3
	Describe the principle, construction and working of Wilson Cloud Chamber for detection clear radiation.	5
	the speed of the electron in the first Bohr orbit.	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. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

QUESTION NO. 1

1	A charge of 4 C is in the field of intensity 4 N/C. the force on charge is (A) 1 N (B) 4 N (C) 8 N (D) 16 N
2	$\frac{\text{Second}}{\text{ohm}}$ is equal to (A) Farad (B) Coulomb (C) Joule (D) Ampere
3	5A current flows through a conductor in 2 minutes, the charge in the conductor is. (A) 10 C (B) 600 C (C) 400 C (D) 500 C
4	If current flowing through a solenoid becomes four times, then magnetic field inside it becomes. (A) Half (B) Two times (C) Three times (D) Four times
5	A 5m wire carrying current 2A at right angle to uniform magnetic field of 0.5 T. The force on the wire is. (A) 10 N (B) 5 N (C) 4 N (D) 2.5 N
6	Henry is equal to (A) $VSA^{-1}$ (B) $VS^{-1}A$ (C) $V^{-1}SA$ (D) $V^{-1}S^{-1}A$
7	If step up transformer 100 % efficient, the primary and secondary windings would have the same (A) Current (B) Power (C) Voltage (D) Direction of winding
8	In R-L-C series circuit, the current at resonance frequency is (A) Zero (B) Minimum (C) Maximum (D) Infinite
9	The amplitude modulation transmission waves have frequencies range (A) 540 Hz to 1600 Hz (B) 540 M Hz to 1600 M Hz (C) 540 K Hz to 1600 K Hz (D) 540 Hz to 1600 K Hz
10	The Curi temperature for iron is (A) 125 °C (B) 163 °C (C) 750 K (D) 750 °C
11	Gain of inverting op-amplifier, if $R_1 = \infty$ and $R_2 = 1$ (A) $\infty$ (B) +1 (C) -1 (D) 0
12	The p-n junction on forward biasing acts as (A) Capacitor (B) Inductor (C) High resistor (D) Low resistor
13	The unit of Plank's constant is (A) JC (B) J/C (C) JS (D) J/S
14	If temp. is doubled for a black body then energy radiated per second per unit area becomes. (A) 4 times (B) $\frac{1}{4}$ times (C) 16 times (D) $\frac{1}{16}$ times
15	The quantized radius of first Bohr orbit of Hydrogen atom is. (A) 0.053 nm (B) 0.053 m (C) 0.0053 nm (D) 0.53 nm
16	The dead time of G.M counter is (A) $10^{-3}$ second (B) $10^{-4}$ second (C) $10^{-6}$ second (D) $10^{-8}$ second
17	The temp. of core of sun is about (A) 50 M °C (B) 40 M °C (C) 20 M °C (D) 10 M °C

**QUESTION NO. 2 Write short answers any Eight (8) parts of the following**

16

i	Suppose that you follow an electric field line due to a positive point charge. Do electric field and potential increased or decreased ?
ii	Do electron tend to go to region of high potential or low potential ?
iii	Define electric flux also write down its SI unit.
iv	Write down the four properties of electric field lines.
v	Is it possible to orient a current loop in a uniform magnetic field such that the loop will not tend to rotate ? Explain
vi	How can you use a magnetic field to separate isotopes of chemical element ?
vii	What is the function of grid ?
viii	Suppose that a charge 'q' is moving in a uniform magnetic field with velocity $\vec{v}$ . Why is there no work done by the magnetic force acts on charge q ?
ix	Why are heavy nuclei unstable ?
x	Explain how $\alpha$ and $\beta$ - particles may ionize an atom without directly hitting the electron ?
xi	What factors make a fusion reaction difficult to achieved ?
xii	If someone accidentally swallows an $\alpha$ -source and a $\beta$ - source which would be more dangerous to him ? Explain why ?

**QUESTION NO. 3 Write short answers any Eight (8) parts of the following**

16

i	Colour code of carbon resistors, usually consists of four bands. Starting from left, interpret the different colour bands with example.
ii	What is meant by a current source ? Explain with example.
iii	Why does the resistance of a conductor rise with temperature ?
iv	Write down advantages and disadvantages of A.M. and F.M.
v	What is the difference between A.C. and D.C circuits ?
vi	A sinusoidal current has <i>rms</i> value of 10 A. What is the maximum or peak value ?
vii	Distinguish between soft and hard ferromagnetic materials.
viii	Describe the terms elasticity and plasticity.
ix	What is doping ? Why intrinsic semiconductors are doped ?
x	What are Logic gates ? Explain Logic OR - gate.
xi	The anode of a diode is 0.2V positive with respect to the cathode. Is it forward biased ?
xii	The inputs of a gate are '1' and '0'. Identify the gate if its output is (a) '0', (b) '1'. Verify the results using Boolean expressions or respective gates.

**QUESTION NO. 4 Write short answers any Six (6) parts of the following**

12

i	Write down any two methods for improving the efficiency of a transformer.
ii	On what factors the self inductance of a coil depends ? Explain briefly.
iii	Does the induced emf in a circuit depend on the resistance of circuit ? Does the induced current depend on the resistance of circuit ?
iv	Four unmarked wires emerge from a transformer. What steps would you take to determine the turns ratio?
v	Why can red light be used in a photographic dark room when developing films, but no white or blue light?
vi	What advantages an electron microscope has over an optical microscope ?
vii	Calculate the wavelength of an electron moving at 40 m/s
viii	Explain why laser action cannot occur without population inversion between atomic levels ?
ix	Write any two uses of lasers in medicine and industry.

**SECTION-II**

**Note: Attempt any Three (3) questions from this section**

8 × 3 = 24

Q.5.(A)	Describe Millikan's oil drop method for determination of charge on an electron.	5
(B)	A rectangular bar of iron is 2.0 cm by 2.0 cm in cross section and 40 cm long. Calculate its resistance if resistivity of iron is $11 \times 10^{-8} \Omega \text{ m}$ .	3
Q.6.(A)	Define and explain mutual induction. Also derived relation for mutual inductance ?	5
(B)	A power line 10.0m high carries a current 200 A. Find the magnetic field of the wire at the ground ?	3
Q.7.(A)	How op-amp can be used as inverting and non inverting amplifier ? Explain.	5
(B)	Find the value of the current flowing through a capacitance $0.5 \mu\text{F}$ when connected to a source of 150 V at 50 Hz.	3
Q.8.(A)	Explain strain energy in deformed material. Use graphical method to determine work done by force. Does this method suit to linear and non- linear extension ?	5
(B)	A particle of mass 5.0 mg moves with speed of $8.0 \text{ ms}^{-1}$ . Calculate its de Broglie wavelength.	3
Q.9.(A)	What is the nuclear reactor ? Give its construction and working.	5
(B)	Calculate the longest wave length of radiation for the Paschen series.	3