

result in zero mark in that question.

QUESTION NO. 1

- 1 SI units of capacitive reactance are
(A) Farad (B) Ohm (C) Volt (D) Ampere
- 2 Which of the following does not undergo plastic deformation?
(A) Glass (B) Copper (C) Wrought iron (D) Lead
- 3 For full-wave rectification, number of diodes used in bridge circuit is
(A) 3 (B) 2 (C) 4 (D) 1
- 4 The SI units of current gain are
(A) Volts (B) Ampere (C) Weber (D) No units
- 5 The Compton shift $\Delta\lambda$ is equal to Compton wave-length at an angle of
(A) Zero (B) 90° (C) 45° (D) 120°
- 6 A single quantum of electromagnetic radiation is called
(A) Photon (B) Meson (C) Positron (D) Quark
- 7 The reverse process of photo electric effect is called
(A) Pair-production (B) Compton effect
(C) Annihilation of matter (D) X-rays emission
- 8 Two down and one up quarks make
(A) Proton (B) Photon (C) Neutron (D) Deuteron
- 9 One Joule of energy absorbed per Kilogram of body is
(A) Rem (B) Roentgens (C) Gray (D) Rutherford
- 10 The minimum charge on any object cannot be less than
(A) 1.8×10^{-19} C (B) 3.2×10^{-19} C (C) 1.6×10^{-19} C (D) 9.1×10^{-19} C
- 11 An electric field can deflect
(A) Neutrons (B) x-rays (C) Gamma-rays (D) Alpha-rays
- 12 The SI units of the temperature coefficient of resistivity of a material are
(A) Ohm-meter (B) Kelvin (C) Per Kelvin (D) Ohm-Kelvin
- 13 Which has high resistance?
(A) Ohm-meter (B) Ammeter (C) Galvanometer (D) Voltmeter
- 14 In order to increase the range of an ammeter, the shunt resistance is
(A) Decreased (B) Increased (C) Kept constant (D) Randomly changed
- 15 The self inductance is given by the relation
(A) $NL = \Phi I$ (B) $NI = L\Phi$ (C) $N = LI\Phi$ (D) $N\Phi = LI$
- 16 If speed of a generator is doubled, the output voltage will be
(A) Same (B) One half (C) Four times (D) Double
- 17 The device which allows only the flow of D.C through a circuit is
(A) Inductor (B) Capacitor (C) Transformer (D) A.C generator

16 - (Obj) - 1st Annual 2023

SEQUENCE - 3

(PAPER CODE)

PHYSICS
GROUP: FIRST

SUBJECTIVE
SECTION-I

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

- i) Suppose that you follow an electric field line due to positive point charge. On electric field and potential increase or decrease?
- ii) Why the voltmeter should have very high resistance?
- iii) A particle which produce more ionization is less penetrating. Why?
- iv) Differentiate between electric potential and electric potential difference.
- v) State ampere's law. Give its significance.
- vi) Charge particle α , β and γ - radiation produce fluorescence. Define fluorescence.
- vii) Do electron tend to go to region of high potential or of low potential?
- viii) Give the working of van - graphy.
- ix) What do we mean that the term critical mass?
- x) How can you use a magnetic field to separate isotopes of chemical elements?
- xi) How can you make electronic trajectory visible, when calculating its charge to mass ratio?
- xii) Give two advantages and disadvantages of nuclear power.

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

- i) Explain why the terminal potential difference of battery decrease when current drawn from it.
- ii) Is the filament resistance lower or higher in 500 w, 220 v light bulb than in 100 w, 220 v light bulb?
- iii) What are the difficulties in testing whether the filament of a light bulb obeys ohm's law?
- iv) How does doubling the frequency affect the reactance of a capacitor?
- v) In a R-L circuit, will the current lag or lead the voltage? Explain with vector diagram.
- vi) What is resonance condition in R-L-C series circuit?
- vii) Distinguish between intrinsic and extrinsic semiconductors?
- viii) Discuss the mechanism of electric conduction by holes and electrons in semiconductors?
- ix) What are ductile and brittle substances? Give one example of each.
- x) What is the net charge on n-type or p-type substance?
- xi) Why charge carriers are not present in depletion region?
- xii) Define open loop gain of operational amplifier.

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

- i) Show that Lenz's law corresponds to law of conservation of energy.
- ii) Show that r and $\frac{dr}{dt}$ have the same units.
- iii) Four unmarked wires emerge from a transformer. What steps would you take to determine the turn ratio?
- iv) Why don't we observe a Compton effect with visible light?
- v) Can pair production take place in vacuum? Explain.
- vi) How the results of special theory of relativity are used in NAVSTAR navigation system?
- vii) What is Stefan Boltzmann's law? Write down the equation of Stefan Boltzmann's law.
- viii) Can the electron in ground state of hydrogen absorb a photon of energy 13.6 eV and greater than 13.6 eV?
- ix) Draw a graph of wavelength versus intensity showing the spectrum of continuous and characteristic x-rays.

SECTION-II

Note: Attempt any Three questions from this section

8 x 3 = 24

- Q.5 (A) Derive an expression for electric potential and derive a relation for electric potential at a point due to a point charge. 3
- (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 the resistivity of iron is $11 \times 10^{-8} \Omega m$. 3
- Q.6 (A) Find an expression for a moving charge in the magnetic field. 3
- (B) The back emf in a motor is 120 V when the motor is turning at 1680 rev per minute. What is the back emf when the motor turns 3360 rev per minute? 3
- Q.7 (A) What is rectification? Explain full wave rectification. How pulsating output voltage is made smooth? 3
- (B) A 10 mH, 20 Ω coil is connected across 240 V and $\frac{180}{\pi}$ Hz source. How much power is dissipated? 3
- Q.8 (A) Explain de Broglie hypothesis. How Davisson and Germer experimentally verified the de-Broglie hypothesis? 3
- (B) A 1.0 m long copper wire is subjected to stretching force and its length increase by 20 cm. Calculate the tensile strain and percent elongation which the wire undergoes. 3
- Q.9 (A) Write the postulate of Bohr's atomic model of Hydrogen atom and show that how de-Broglie's hypothesis confirm one of its postulate. 3
- (B) A 75 kg person receives a whole body radiation dose of 24 m-rad, delivered by α -particles for which RBE factor is 12. Calculate (i) Absorbed energy in joules (ii) Equivalent dose in rem. 3