

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. Write PAPER CODE, which is printed on this question paper, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

- 1) A spectrum of radiation is which the quantity being studied, such as frequency or energy takes discrete value is called _____ spectra.
(A) Band (B) None (C) Continuous (D) Discrete
- 2) The particles greater in mass than protons are called
(A) Mesons (B) Baryons (C) Bosons (D) Nucleons
- 3) Moderator in fission process slow down the fast neutrons and make it easy to produce fission is
(A) Uranium-235 (B) Thorium-223 (C) Natural Uranium (D) Uranium 239
- 4) Two opposite point charge of same magnitude separated by distance "2d", electric potential midway between them is.
(A) 1 V (B) 2 V (C) Zero (D) $\frac{V}{2}$
- 5) Electron volt (eV) is the unit of.
(A) Potential (B) Electric field (C) Energy (D) Charge
- 6) The SI unit of temperature co-efficient of resistivity is
(A) $^{\circ}\text{C}^{-1}$ (B) $^{\circ}\text{F}^{-1}$ (C) K^{-1}m (D) K^{-1}
- 7) A galvanometer can be made sensitive by.
(A) Using a small and thick suspension (B) Decreasing the area of coil (C) Increasing the magnetic field (D) Decreasing the turn of coil
(A) Circular (B) Spiral (C) Helix (D) Ellipse
- 9) The principle of an electric generator is based on.
(A) Coulomb's Law (B) Faraday's Law of Electro magnetic Induction (C) Ampere's Law (D) Lenz's Law
- 10) The SI unit of mutual induction is
(A) $\text{Vs}^{-1}\text{A}^{-1}$ (B) VsA^{-1} (C) Henry (D) Both (B) & (C)
- 11) An expression for capacitive reactance is given by.
(A) $X_c = \frac{1}{2\pi fC}$ (B) $X_c = \frac{1}{2\pi f}$ (C) $X_c = 2\pi fC$ (D) $X_c = 2\pi fL$
- 12) At what frequency will an inductor of 1.0 H have a reactance of $500\ \Omega$?
(A) 90 Hz (B) 100 Hz (C) 80 Hz (D) 110 Hz
- 13) The electrical resistance of mercury disappears suddenly as the temperature is reduced
(A) Above 4.2 K (B) Below 4.2 K (C) To 4.2 K (D) 7.1 K
- 14) In P-type material, the majority charge carriers are
(A) Electrons (B) Protons (C) No charge (D) Holes
- 15) The output of two input OR Gate is "0" only when its.
(A) Both inputs are "0" (B) Either input is "1" (C) Both input are "1" (D) Either input is "0"
- 16) The mass "m" of a moving object with speed $0.8c$ is.
(A) $0.66 m_0$ (B) $0.97 m_0$ (C) $1.67 m_0$ (D) $1.08 m_0$
- 17) In Compton effect the wavelength of Scattered X-rays is _____ than the wavelength of incident X-rays.
(A) Smaller (B) Larger (C) Same order (D) All of these

SGD-12-1-23

1223 Warning:- Please, do not write anything on this question paper except your Roll No.
Physics (Subjective) (Group I) (Session 2019-21 to 2021-23) (Inter Part - II) Paper (II)

Time Allowed: 2.40 hours

Section ----- I

Maximum Marks: 68

8 × 2 = 16

2. Answer briefly any Eight parts from the followings:-

- (i) How can you identify that which plate of a capacitor is positively charged.
- (ii) Electric lines of force never cross. Why? (iii) Write down the properties of electric field lines.
- (iv) How can we find the dielectric constant of a material using a capacitor.
- (v) If a charged particle moves in a straight line through some region of space, can we say that the magnetic in the region is zero. (vi) Why does the picture on a TV screen becomes distorted when a magnet is brought near the screen.
- (vii) What is meant by Lorentz force. Give its equation.
- (viii) $\vec{B} = 40\hat{i} - 18\hat{k}$. How much flux passes through 5 cm^2 area of loop in xy-plane.
- (ix) What are isotopes? What do they have common and what are their differences.
- (x) How radioactivity can help in treatment of cancer? (xi) What does a mass-spectrograph do.
- (xii) Explain the process of α -decay with an example

8 × 2 = 16

3. Answer briefly any Eight parts from the followings:-

- (i) Write uses of rheostat? (ii) Do bends in a wire affect its electrical resistance? Explain.
- (iii) Why does the resistance of a conductor rise with temperature?
- (iv) At what frequency will an inductor of 1.0 H have a reactance of 500Ω ?
- (v) How does doubling the frequency affect the reactance of (a) an inductor (b) a capacitor.
- (vi) In a R-L circuit, will the current lag or lead the voltage? Illustrate your answer by a vector diagram.
- (vii) Differentiate between glassy solids and polymeric solids.
- (viii) Write any two properties of an insulator.
- (ix) What is meant by para and ferromagnetic substances. Give examples for each.
- (x) In a certain circuit, the transistor has a collector current of 10 mA and a base current of $40 \mu\text{A}$. What is the current gain of the transistor?
- (xi) Why charge carriers are not present in the depletion region? (xii) why ordinary silicon diodes do not emit light?

4. Answer briefly any Six parts from the followings:-

6 × 2 = 12

- (i) How the efficiency of a transformer can be improved. (ii) What is the annihilation of matter.
- (iii) Four un marked wires emerges from a transformer. What steps should be taken to determine the turn ratio.
- (iv) In a certain region, the earth's magnetic points vertically down. When a plane flies due north which wing tip is positively charged.
- (v) Why we do not notice the de-broglie wavelength for a pitched cricket ball.
- (vi) What happens to the total radiations from black body if its absolute temperature is doubled.
- (vii) What advantages an electron microscope has over an optical microscope. (viii) Give two uses of Laser.
- (ix) Explain why laser operation can not occur without population inversion between two atomic levels.

Note: Attempt any three questions.

Section ----- II

(8 × 3 = 24)

5. (a) Define conventional current. How current passes through a metallic conductor. Also explain drift velocity of electrons in a metal.
- (b) Determine the electric field at the position $\vec{r} = (4\hat{i} + 3\hat{j})\text{m}$ caused by a point charge $q = 5.0 \times 10^{-6} \text{ C}$ placed at origin.
6. (a) Define and explain mutual induction. Also derive relation for mutual induction.
- (b) How fast must a proton move in a magnetic field of $2.50 \times 10^{-3} \text{ T}$ such that the magnetic force is equal to its weight?
7. (a) What is operational amplifier? How operational amplifier as a comparator, act as a "Night Switch".
- (b) A circuit has an inductance of $\frac{1}{\pi} \text{ H}$ and resistance of 2000Ω . A 50 Hz A.C is supplied to it. Calculate the reactance and impedance offered by the circuit.
8. (a) What is energy band theory? How does this theory explain diverse electric behaviour of solids?
- (b) X-rays of wavelength 22 pm are scattered from a carbon target. The scattered radiations being viewed at 85° to the incident beam. What is Compton shift?
9. (a) What is mass spectrograph? Describe an experimental arrangement of a spectrograph and derive the relation showing mass and B^2 as in linear relation.
- (b) Calculate the longest wavelength of radiation for the Paschen series.