

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 in 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 slows down the fast neutrons and makes it easy to produce fission is
  - (A) Uranium-235
  - (B) Thorium-223
  - (C) Natural Uranium
  - (D) Uranium 239
- 4) Two opposite point charges 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 coefficient of resistivity is
  - (A)  $^{\circ}\text{C}^{-1}$
  - (B)  $^{\circ}\text{F}^{-1}$
  - (C)  $\text{K}^{-1}\text{m}$
  - (D)  $\text{K}^{-1}$
- 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 number of coil
- 8) \_\_\_\_\_
  - (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)  $\text{VsA}^{-1}$
  - (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 inputs 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<sup>2</sup> 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  $\alpha$ -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 500  $\Omega$ ?
- (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  $\mu A$ . 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 in version 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  $\vec{r} = (4\hat{i} + 3\hat{j})m$  caused by a point charge  $q = 5.0 \times 10^{-6} C$  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  $2.50 \times 10^{-3} T$  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  $\frac{1}{\pi} H$  and resistance of 2000  $\Omega$ . 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.

1223 Warning:- Please write your Roll No. in the space provided and sign. Roll No.-----

( Inter Part – II)

(Session 2019-21 to 2021-23)

Sig. of Student -----

Physics (Objective) *SAD-12-2-23* (Group II)

Paper (II)

Time Allowed:- 20 minutes

PAPER CODE 4476

Maximum Marks:- 17

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) Isotopes of Xenon are  
(A) 12 (B) 24 (C) 36 (D) 37
- 2) Binding energy per nucleon is maximum for  
(A) Uranium (B) Gold (C) Silver (D) Iron
- 3) The value of relative permittivity of air is close to  
(A) Vacuum (B) Paraffined paper (C) Teflon (D) Transformer oil
- 4) The electric flux through any close surface is depending on  
(A) Shape of close surface (B) Medium (C) Size of close surface (D) Location of charge
- 5) Thermo-couples convert heat energy into  
(A) Wind energy (B) Potential energy (C) Nuclear energy (D) Electrical energy
- 6) The value of permittivity of free space is  
(A)  $4\pi \times 10^{-7} \text{WbA}^{-1}\text{m}^{-1}$  (B)  $\pi \times 10^{-7} \text{WbA}^{-1}\text{m}^{-1}$  (C)  $2\pi \times 10^{-7} \text{WbA}^{-1}\text{m}^{-1}$  (D)  $2\pi r \times 10^{-7} \text{WbA}^{-1}\text{m}^{-1}$
- 7) The magnetic field inside the current carrying long solenoid is  
(A) Strong (B) Weak (C) Zero (D) Uniform
- 8) The magnetic field inside the current carrying long solenoid is  
(A) Maximum (B) Zero (C) Minimum (D) 3V
- 9) Lenz's law is called as the law of conservation of  
(A) Charge (B) Parity (C) Momentum (D) Energy
- 10) Direct current cannot pass through  
(A) Inductor (B) Resistor (C) Chock (D) Capacitor
- 11) The expression for inductive reactance is  
(A)  $\omega L$  (B)  $\frac{2\pi L}{f}$  (C)  $\frac{1}{\omega L}$  (D) TL
- 12) The critical temperature of mercury is .  
(A) 1.18 K (B) 4.2 K (C) 3.72 K (D) 7.2 K
- 13) Actual movement across the diode Junction is due to  
(A) Holes (B) Ions (C) Protons (D) Electrons
- 14) At the junction of diode, where no charge carrier is present is called  
(A) Active region (B) Depletion region (C) Saturated region (D) Forbidden region
- 15) Which one explain particle nature of light  
(A) Interference (B) Diffraction (C) Polarization (D) Photoelectric effect
- 16) Who gave the idea of matter waves  
(A) Einslein (B) Huygen (C) De-Broglie (D) Newton
- 17) Electron cannot be resided in the nucleus, it can be proved by  
(A) Photoelectric effect (B) Pair production (C) Uncertainty principle (D) De-Broglie Hypothesis

1223- 1223 -- 12000 (3)

Time Allowed: 2.40 hours Section ----- I (Inter Part - II) Maximum Marks: 68

2. Answer briefly any Eight parts from the followings:-  $8 \times 2 = 16$
- Write similarity and differences between electrostatic and gravitational forces?
  - Verify that an ohm times farad is equivalent to second? (iii) Electric lines of forces never cross. Why?
  - Is 'E' necessarily zero inside a charged rubber balloon, if balloon is spherical? Assume that charge is distributed uniformly over the surface?
  - Why the resistance of an ammeter should be very low?
  - Why does the picture on a TV screen become distorted when a magnet is brought near the screen?
  - Draw saw tooth voltage wave form and describe it? (viii) Write uses of CRO?
  - Write the names of hydrogen isotopes with their symbols?
  - Why moderators are used in the core of nuclear reactor?
  - Why are heavy nuclei unstable? (xii) A particle which produces more ionization is less penetrating?

3. Answer briefly any Eight parts from the followings:-  $8 \times 2 = 16$
- Do bends in a wire affects its electrical resistance? Explain.
  - On what factors chemical effect of current depends?
  - Describe a circuit which will give continuously varying potential.
  - How many times per second will an incandescent lamp reach a maximum brilliance when connected to a 50 Hz source?
  - What is Amplitude Modulation and Frequency Modulation?
  - How the reception of a particular radio station is selected on your radio set?
  - What is meant by hysteresis loss? How it is used in the construction of a transformer?
  - Distinguish between Elasticity and plasticity of a body.
  - Discuss the mechanism of electrical conduction by "Holes" and "Electrons" in a pure semiconductor elements.
  - Why is the base current in a transistor is very small?
  - Draw the circuit diagram for "Half wave" and "Full wave" rectification.
  - Why ordinary silicon diodes donot emit light?

4. Answer briefly any Six parts from the followings:-  $6 \times 2 = 12$
- What is back emf effect in motors? (ii) What are advantages of lasers over ordinary light.
  - Can a DC motor be turned in a DC generator? What changes are required?
  - Does induced emf in a circuit depend on the resistance of the circuit? Explain.
  - Which has the lower energy quanta? Radiowaves or X-rays. (vi) Can pair production take place in vacuum? Explain.
  - Draw block diagram of electron microscope. Write any one of its advantage.
  - What is planck's assumption to explain black body radiations?
  - What is a spectral series? Name any one spectral series of hydrogen with its relation.

Note: Attempt any three questions. Section ----- II  $(8 \times 3 = 24)$

- Derive the equation of a balanced wheatstone Bridge with diagram.
  - A particle having a charge of 20 electrons on it falls through a potential difference of 100 volts. Calculate the energy acquired by it in electron-volts (eV).
- Find the relation of force on a moving charge in a constant magnetic field. Also find its direction.
  - A coil of 10 turns and  $35 \text{ cm}^2$  area is in a perpendicular magnetic field of 0.5T. The coil is pulled out of the field in 1.0 S. Find the induced emf in the coil as it is pulled out of the field.
- Explain the RLC series resonance circuit. Derive the relation for resonance frequency. Also discuss the properties of series resonance circuit?
  - In a certain circuit the transistor has collector current of 10 mA and base current is  $40 \mu \text{ A}$ . What is the current gain of transistor?
- Define and explain uncertainty principle.
  - A wire 2.5m long and cross-sectional area  $10^{-5} \text{ m}^2$  is stretched 1.5 mm by a force of 100N in the elastic region. Calculate. (i) the strain. (ii) Young's modulus. (iii) The energy stored in the wire.
- What is solid state detector? Explain its principle, construction and working.
  - An electron jumps from a level  $E_i = -3.5 \times 10^{-19} \text{ J}$  to  $E_f = -1.20 \times 10^{-19} \text{ J}$  What is the wavelength of the emitted light.