Physics (Objective) (GROUP-II) Time: 20 Minutes Marks : 1

RWP-2-24

Note: Write Answers to the Questions on the objective answer sheet provided. Four possible answers A, B, C and D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with Marker or Pen ink on the answer sheet provided.

1.1 The rest mass of photon is:
(A) Zero (B) $1.67 \times 10^{-27}\, kg$ (C) $1.67 \times 10^{-31}\, kg$ (D) $9.1 \times 10^{-31}\, kg$

2. X-rays are also known as:
(A) Cathode rays (B) Positive rays (C) r-rays (D) Alpha rays

3. The atomic number of $^{141}_{56}Ba$ is:
(A) 141 (B) 56 (C) 85 (D) 92

4. One unified mass scale (1U) is equal to:
(A) $1.66 \times 10^{-19}\, kg$ (B) $1.66 \times 10^{-27}\, kg$ (C) $1.66 \times 10^{-31}\, kg$ (D) $1.66 \times 10^{-28}\, kg$

5. Value of dielectric constant for vacuum is:
(A) Less than 1 (B) Greater than 1 (C) One (D) 1.5

6. Gold band on resistor represent its tolerance equal to:
(A) $\pm 10\%$ (B) $\pm 5\%$ (C) $\pm 15\%$ (D) $\pm 20\%$

7. An apparatus placed within a metal enclosure is "shielded" from:
(A) Electric field (B) Magnetic field (C) Gravitational field (D) Electromagnetic field

8. The SI unit of magnetic induction is:
(A) Weber (B) Tesla (C) Newton (D) Joule

9. The sensitivity of Galvanometer can be increased by decreasing:
(A) C/BAN (B) B/ACN (C) CB/AN (D) NC/AB

10. The minus sign in Faraday's law of electromagnetic induction shows that the direction of induced emf is such that it opposes the change in:
(A) Electric flux (B) Electromagnetic flux (C) Gravitational flux (D) Magnetic flux

11. The emf induced in a generator is:
(A) $N\omega AB\, Sin\theta$ (B) $N\omega IB\, Sin\theta$ (C) $NAB\, Sin\theta$ (D) $N\omega B\, Sin\theta$

12. If I_0 is the peak value of A.C current, its average value over a complete cycle is:
(A) $\sqrt{2}\, I_0$ (B) $I_0/\sqrt{2}$ (C) $\sqrt{\dfrac{I_0}{2}}$ (D) Zero

13. The value of angular frequency "ω" is equivalent to:
(A) $2\pi T$ (B) $4\pi f$ (C) $2\pi f$ (D) πf

14. Based on the geometrical structure and arrangement of atoms, there are ____ crystal systems:
(A) 6 (B) 5 (C) 7 (D) 8

15. The potential barrier for the Ge^n at room temperature is:
(A) 0.7 v (B) 1.0 v (C) 0.6 v (D) 0.3 v

16. The mathematical notation for exclusive OR-operation is:
(A) $X = \overline{A + B}$ (B) $X = A\overline{B} + B\overline{A}$ (C) $X = \overline{AB + BA}$ (D) $X = \overline{A - B}$

17. The photoelectric effect explained by:
(A) Darission (B) Gerwer (C) Hertz (D) Einstein

Roll No _____

HSSC-(P-II)- A-2024

(For All Sessions)

(GROUP-II)

Marks : 68

Time: 2:40 hours

Physics (Subjective)

SECTION-I

RWP-2-24

2. Write short answers of any eight parts from the following: (8x2=16)

i. Differentiate between electric potential difference and electric potential energy difference and write its relation.

ii. Why is the potential difference between the plates of capacitor decreased when dielectric material is inserted between the plates?

iii. Describe the force or forces on a positive point charge when placed between parallel plates with opposite & equal charges.

iv. If a point charge q of mass m is released in a non-uniform electric field with field lines pointing in the same direction, will it make a rectilinear motion?

v. What is the advantage of synchronization control in case of CRO?   vi. What is digital multimeter? Why is it easier to use?

vii. How can a current loop be used to determine the presence of a magnetic field in a given region of space?

viii. What should be the orientation of a current carrying coil in a magnetic field so that torque acting upon the coil is (a) maximum (b) minimum?

ix. Equal doses of different radiations do not produce same biological effect. Explain.   x. Name the six quarks.

xi. State two sources of "background radiation"   xii. How can radioactivity help in the treatment of cancer?

3. Write short answers of any eight parts from the following: (8x2=16)

i. What are the difficulties in testing whether the filament of a lighted bulb obeys Ohm's law?

ii. What is thermistor? Write its principle.   iii. Explain under what condition, the wheat stone bridge is said to be balanced?

vi. How many times per second will an incandescent lamp reach maximum brilliance when connected to a 50Hz source?

v. What is modulation signal and what are the carrier wave?   vi. Why the choke is used in A.C. circuits?

vii. What is meant by strain energy? How can it be determined from the force-extension graph?

viii. Differentiate between Young's modulus and Bulk's modulus   ix. What is hysteresis loss?

x. What is a net charge on a n-type or a p-type substance?   xi. How is p-n junction formed?

xii. Calculate the gain of a non-inverting amplifier when $R_1 = infinity$ and $R_2 = 0$

**4.** Write short answers of any six parts from the following: (6x2=12)

i. Does the induced emf in a circuit depend on the resistance of the circuit?

ii. Is it possible to change both the area of the loop and magnetic field passing through the loop and still not have an induced emf in the loop?

iii. When does light behave as a wave? When does it acts as a particle?

iv. If an electron and proton have the same de-broglie wavelength, which particle has greater speed?

v. How can the spectrum of hydrogen contain so many lines? when hydrogen contain one electron.

vi. What is the principle of A.C. generator?   vii. What are inertial and non-inertial frame of references?

viii. What is the difference between special theory of relativity and general theory of relativity?

ix. Differentiate between ionization energy and excitation energy.

SECTION-II

Note   Attempt any three questions. Each question carries equal marks: (8x3=24)

5. (a) Derive a relation for electrical potential at a point due to a point charge. (5)

(b) The resistance of an iron wire at $0°C$ is $1 \times 10^4 \Omega$. What is resistance at $500°C$, if the temperature co-efficient of resistance of iron is $5.2 \times 10^{-3} k^{-1}$? (3)

6. (a) Define transformer. Explain its principle, construction and working. (5)

(b) What current should pass through a solenoid that is 0.5 m long with 10,000 turns of copper wire so that it will have a magnetic field of 0.4T? (3)

7. (a) What is the series resonance circuit? Derive the relation of resonance frequency and write down its properties. (5)

(b) Calculate the output of the op-amp circuit shown in figure: (3)
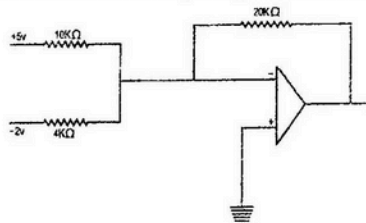
8. (a) Write a note on energy band theory and classify conductors, insulators and semiconductors on the basis of this theory. (5)

(b) What is the maximum wavelength of the two photons produced when a positron annihilates an electron? The rest mass energy of each is 0.51 MeV. (3)

9. (a) Define fusion reaction. Explain it in sun with the help of nuclear reactions. (5)

(b) Compute the shortest wavelength radiation in Balmer series? What value of 'n' must be used. (3)