



Roll No. _____

HSSC-(P-II)-A-2024
(For All Sessions)

Paper Code

8

4

7

7

Physics (Objective)**(GROUP-I)****Time: 20 Minutes****Marks : 17**

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 One henry is equal to:

(A) $V S^{-1} A^{-1}$

(B) $V S A^{-1}$

(C) $V S^{-1} A$

(D) $V^{-1} S A$

2. When motor is overloaded, the magnitude of back emf is:

(A) Constant

(B) Increases

(C) Decreases

(D) Infinite

3. In capacitor circuit phase between current and charge is:

(A) Parallel

(B) In phase

(C) Anti parallel

(D) Out of phase

4. At resonance frequency the impedance of RLC series circuit is:

(A) Minimum

(B) Maximum

(C) Both (A) and (B)

(D) Infinite

5. Which has least hysteresis loop area?

(A) Soft iron

(B) Steel

(C) Wrought iron

(D) Cobalt

6. During negative half cycle of A.C., $p-n$ junction has:

(A) Low resistance

(B) No resistance

(C) High resistance

(D) Remain same

7. Device which converts low voltage or current to high voltage or current is:

(A) Rectifier

(B) Transformer

(C) Inductor

(D) Amplifier

8. The momentum of photon is represented by the equation:

(A) $p = mv$

(B) $p = \frac{h}{\lambda}$

(C) $p = \frac{\lambda}{h}$

(D) $p = h\lambda$

9. The energy needed by photon to create electron-positron pair is:

(A) $1.02 MeV$

(B) $0.52 MeV$

(C) $0.051 MeV$

(D) $1.51 MeV$

10. Bremsstrahlung radiations are example of:

(A) Molecular spectra

(B) Atomic spectra

(C) Continuous spectra

(D) Discrete spectra

11. 1 rem is equal to:

(A) $0.1 SV$

(B) $0.01 SV$

(C) $2.04 SV$

(D) $3.06 SV$

12. Radiotherapy is generally done with γ -rays emitted from:

(A) Iodine-131

(B) Strontium-90

(C) Sodium-24

(D) Cobalt-60

13. Charge on the Droplet can be calculated by:

(A) $q = \frac{mg}{vd}$

(B) $q = \frac{v}{mgd}$

(C) $q = \frac{mgd}{v}$

(D) $q = \frac{d}{mgd}$

14. If the distance between two charges is halved, Force becomes:

(A) One fourth

(B) Four times

(C) Half

(D) Double

15. The minimum power is delivered to across the resistor R , when:

(A) $r = \infty$

(B) $r = 0$

(C) $r = R$

(D) $r = R/4$

16. A positive charge is moving away from observer. Direction of magnetic induction will be:

(A) Anticlockwise

(B) Towards right

(C) Towards left

(D) Clockwise

17. Shunt resistance is:

(A) Low resistance

(B) High resistance

(C) Zero resistance

(D) Impedence

625-12-A

R

Physics (Subjective)**SECTION-I***RWP-1-24***2. Write short answers of any eight parts from the following:**

(8x2=16)

- Define electric polarization and electric dipole.
- Sketch the graphs for charging and discharging of a capacitor.
- The potential is constant throughout a given region of space. Is the electric field zero or non-zero in this region? Explain
- How can you identify that which plate of a capacitor is positively charged?
- Can an electron at rest be set in motion with a magnet? Explain.
- How does the graph pattern appear stationary on the screen of CRO? Explain the condition.
- 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?
- Why the voltmeter should have a very high resistance?
- What factors make a fusion reaction difficult to achieve?
- What information is revealed by the length and shape of the tracks of an incident particle in Wilson cloud chamber?
- What is meant by dose of radiation? What is its S.I. unit?
- Why Geiger counter is not suitable for fast counting?

3. Write short answers of any eight parts from the following:

(8x2=16)

- Why does the resistance of a conductor rise with temperature?
- What is meant by A.M. and F.M.?
- Describe a circuit which will give a continuously varying potential.
- Why potentiometer is a better instrument than a voltmeter to measure potential difference? Explain briefly.
- In an R.L circuit, will the current lag or lead the voltage? Illustrate your answer by a vector diagram.
- When a 100v are applied to an A.C. circuit, the current flowing in it is 100mA. Find its impedance.
- What is meant by para, dia and ferromagnetic substance? Give examples for each.
- Define curie temperature. Also write the value of curie temperature for iron.
- Differentiate between elasticity and plasticity of a material.
- Why ordinary silicon diodes do not emit light?
- Evaluate the gain of a non-inverting amplifier for external resistances $R_1 = 5K\Omega$ and $R_2 = 20K\Omega$.
- Draw characteristic curves for the forward biased and reverse biased $p-n$ junction diode.

4. Write short answers of any six parts from the following:

(6x2=12)

- Show that ϵ and $\frac{\Delta\phi}{\Delta t}$ have the same units.
- Write any four applications of photocell.
- Can a D.C. motor be turned into a D.C. generator? What changes are required to be done?
- What is the main difference between A.C. generator and D.C. generator in its construction?
- What are the measurements on which two observers in relative motion will always agree upon?
- Will bright light eject more electrons from a metal surface than dimmer light of the same colour?
- Is it possible to create a single photon in annihilation of matter? Explain briefly.
- Can the electron in the ground state of hydrogen absorb a photon of energy 13.6 eV and greater than 13.6 eV
- Differentiate between excited state and metastable state. Also write the residing times for each state.

SECTION-II**Note Attempt any three questions. Each question carries equal marks:**

(8x3=24)

- Derive the relation for energy stored in a capacitor. Calculate the energy density. (5)
 - A platinum wire has a resistance of 10Ω at 0°C and 20Ω at 273°C . Find the value of temperature coefficient of resistance of platinum. (3)
- What is alternating current generator? Find the value of instantaneous induced current by it. (5)
 - A power line 10 m high carries a current 200A. Find the magnetic field of the wire at the ground? (3)
- Derive an expression for resonance frequency in R-L-C series circuit. Also write down the properties of the series resonance. (5)
 - The current flowing into the base of a transistor is $100\mu\text{A}$. find its collector current I_c , its emitter current I_E and the ratio I_c/I_E , if the value of current gain β is 100. (3)
- Explain "Energy Band Theory" of solids. How does it help to distinguish between conductors, insulators & semi conductors? (5)
 - What is the maximum wavelength of two photons produced when a positron annihilates an electron? The rest mass energy of each is 0.51 MeV. (3)
- What are inner shell transition? Also discuss the production of x-rays. (5)
 - If $^{233}_{92}\text{U}$ decays twice by α -emission, what is the resulting isotopes? (3)