

Total Time: 3:00 Hours

P-345
MRD-12TH 07052025 (A-I)

Physics (Part-II)

Total Marks: 85

Note: There are three sections in this paper i.e A, B & C.

VERSION: A

Instructions:

- Please attempt Section-A on the MCOs Answer Sheet only.
- Only black ball point or marker may be used for shading the relevant circle.
- Please make sure that there is no cutting, over writing, erasing, or multiple circles shading.

Time Allowed: 20 Minutes

"Section - A"

Marks: 18

Q.1. Choose the correct option i.e A, B, C or D.

1. Joule / coulomb is the SI Unit of _____
(A) Work (B) Charge (C) Volt (D) Potential Difference
2. $1 \text{ eV} =$ _____
(A) $1.602 \times 10^{18} \text{ J}$ (B) $1.602 \times 10^{19} \text{ J}$ (C) $1.602 \times 10^{20} \text{ J}$ (D) $1.602 \times 10^{21} \text{ J}$
3. The reciprocal of resistance of a conductor is called _____
(A) Conductance (B) Reactance (C) Impedance (D) Capacitance
4. Radiant converts _____ directly into electrical energy.
(A) Heat (B) Sunlight (C) X- Rays (D) Radio Waves
5. When a wire is stretched and its radius becomes $y/2$, then its resistance will be _____
(A) $16 R$ (B) $4 R$ (C) $2 R$ (D) 0
6. One weber is equal to _____
(A) NA^2/m (B) Nm^2/A (C) NA/m (D) Nm/A
7. The resistance of an ideal voltmeter is _____
(A) Large (B) Small (C) Zero (D) Infinite
8. Principal of dynamically induced emf is used in a _____
(A) Thermo- Couple (B) Choke (C) Generator (D) Transformer
9. In case of DC, inductive reactance X_L is _____
(A) Infinite (B) Maximum (C) Minimum (D) Zero
10. The rms value of a sine wave is 100 A. Its peak value is _____
(A) 70.7 A (B) 141.4 A (C) 150 A (D) 282.8 A
11. The circuit in which current and voltage are in phase, the power factor is _____
(A) +1 (B) -1 (C) Zero (D) 2
12. If the ultimate strength and fracture points are close, the material is said to be _____
(A) Hard (B) Tough (C) Ductile (D) Brittle
13. The ratio of stress to strain is _____
(A) 0 (B) >1 (C) <1 (D) Constant
14. PN junction when reversed biased act as _____
(A) Capacitor (B) Inductor (C) ON Switch (D) OFF Switch
15. The relation $E = \sigma T^4$ is called _____
(A) Wein's Displacement Law (B) Stephen - Boltzman Law (C) Planck's Quantum Law (D) Raleigh - Jean's Law
16. According to de-Broglie equation, which one has the smallest wavelength with it _____
(A) Electron (B) Proton (C) Neutron (D) α - Particle
17. The duration of meta- Stable state is approximately _____
(A) 10^{-3} s (B) 10^{-6} s (C) 10^{-8} s (D) 10^{-10} s
18. The nucleus that results from the reaction ${}^6_0\text{n} + {}^{16}_8\text{O} \rightarrow ? + {}^2_1\text{H}$ is _____
(A) ${}^{15}_7\text{N}$ (B) ${}^{17}_8\text{O}$ (C) ${}^{14}_8\text{O}$ (D) ${}^{14}_7\text{N}$

"Section – B"**Marks: 40****Q-2. Write short answers to any ten (10) of the following parts. All parts carry equal marks:-**

- (i) Show that $E = -\frac{\Delta V}{\Delta r}$.
- (ii) How can you increase the capacitance of a capacitor.
- (iii) If aluminum and copper wires of the same length have the same resistance, Which has the larger diameter and why?
- (iv) Define kilowatt – Hour. Show that $1\text{KWh} = 3.6\text{ MJ}$
- (v) How a 5mA , 100π galvanometer is converted into 20v voltmeter.
- (vi) How can neutrons be accelerated in a cyclotron?
- (vii) Differentiate between statically and dynamically induced emf.
- (viii) For RLC series AC circuit show that $f\gamma = \frac{1}{2\pi\sqrt{LC}}$?
- (ix) Define the terms: strength, Hardness, Brittleness, Stiffness.
- (x) Why CE configuration is widely used in amplifier circuits.
- (xi) If an electron and a proton have the same de- Broglie wavelength, Which particle has greater speed?
- (xii) Find the voltage applied to the tube . If the shortest wavelength produced by an X-ray tube is 0.46 nm .
- (xiii) Why neutron activated nuclides tend to decay by β^- rather than β^+ .
- (xiv) How does the crystal structure influence the mechanical properties of a material?

"Section – C"**Marks: 27****Note: Answer any three (3) questions. All questions carry equal marks:-**

- Q-3. (i) Show that energy stored in a capacitor is $u = \frac{1}{2} CoCrE^2$.
- (ii) Find electric field at a distance 30 cm from a $3\mu\text{C}$ point charge.
- Q-4. (i) State Ampere's law and use it to derive an expression for the magnetic field of a solenad.
- (ii) Show that cyclotron frequency of a particle in a magnetic field is given $f = \frac{qB}{2\pi m}$?
- Q-5. (i) Define the terms Ground State, Excited State, Excitation Energy and Ionization Energy.
- (ii) Find the wavelength associated with an electron in the state $n=4$ of hydrogen.
- Q-6. Give a brief explanation of any two of the following: qrc- 3168
- (i) State coulomb's Law and show that $F = \frac{1}{4\pi\epsilon} \frac{q_1 q_2}{r^2}$
- (ii) Define Radioactivity. Discuss Half life and rate of decay of a radioactive malarial.
- (iii) State and explain Heisenberg's uncertainty Principle.