

Total Time: 3:00 Hours

MRD-10<sup>TH</sup> 22042025 (A-I)

Physics (10<sup>th</sup>)

Total Marks: 65

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: 12

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

- The time period of an oscillating object is 2s, its frequency is.  
☐ A 0.1 Hz ☐ B 0.5 Hz ☐ C 5 Hz ☐ D 50 Hz
- Waves that require a medium for propagation among the following are:  
☐ A Ultraviolet waves ☐ B Sound waves ☐ C Radio waves ☐ D Microwaves
- The increase in the frequency of sound increases its  
☐ A Amplitude ☐ B Intensity ☐ C Loudness ☐ D Pitch
- A ray passing through the focal point of a concave mirror is reflected:  
☐ A At an equal angle to the axis ☐ B Back on itself ☐ C Parallel to the principal axis ☐ D Through the focal point
- The refractive index of kerosene oil is 1.44, the speed of light in kerosene oil is:  
☐ A  $0.48 \times 10^8$  m/s ☐ B  $2.08 \times 10^8$  m/s ☐ C  $4.32 \times 10^8$  m/s ☐ D  $4.44 \times 10^8$  m/s
- The direction of the electric field at a point due to positive charge is:  
☐ A Circular around the charge ☐ B Radially inward ☐ C Radially outward ☐ D Tangent to the charge
- In a circuit, two resistors with resistance  $5\Omega$  and  $20\Omega$  are connected in parallel. The total resistance of circuit is:  
☐ A  $\frac{1}{15}\Omega$  ☐ B  $\frac{4}{5}\Omega$  ☐ C  $4\Omega$  ☐ D  $25\Omega$
- In a transformer, the primary coil is connected to:  
☐ A A.C voltage source ☐ B Resistor ☐ C DC voltage source ☐ D Inductor
- If an electric field is applied parallel to the direction of electron beam, the electron will.  
☐ A Speed up ☐ B Slow down ☐ C Deflect ☐ D Not change their state
- Electric or electromagnetic representation of data is termed as:  
☐ A Signal ☐ B Program ☐ C Software ☐ D Transmission
- The number of neutrons in a nucleus of  $^{210}_{83}\text{Bi}$  is:  
☐ A 83 ☐ B 127 ☐ C 210 ☐ D 293
- For a fission reaction to initiate, a uranium nucleus absorbs a neutron having:  
☐ A High energy ☐ B Moderate energy ☐ C Low energy ☐ D No energy

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**Physics (10<sup>th</sup>)**

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Total Marks: 53

Time Allowed: 2.40 Hours

**"Section – B"**

Marks: 32

Q-2. Write short answers to any eight (8) of the following parts. All parts carry equal marks:-

- (i) Differentiate between echo and reverberation.
- (ii) Find the speed of sound in air at 10 °C.
- (iii) What are the symptoms and causes of hyperopia and how can it be corrected using lenses?
- (iv) State coulomb's law and derive formula for force between two stationary point charges.
- (v) What is electrical power? Derive three formulae for power using voltage, current, and resistance.
- (vi) A current of 10 A is used to boil a kettle in 5 minutes using  $3.6 \times 10^5$  J of energy. Find the potential difference across the kettle.
- (vii) Define induced emf and list three factors affecting the magnitude of induced emf.
- (viii) Define logic gates and describe the operation of OR gate by drawing its symbol and truth table.
- (ix) What are information storages devices? Describe the use of audio and video cassettes.
- (x) Write the nuclear reaction for the alpha decay of  $^{238}_{92}\text{X}$  and  $^{222}_{86}\text{X}$ . (X represents parent and Y represent daughter nuclei)
- (xi) Explain the concept of radioactive dating and its use in determining the age of ancient objects.

**"Section – C"**

Marks: 21

Note: Answer any three (3) questions. All questions carry equal marks:-

- Q-3. (a) Define simple pendulum and derive mathematical expression for its time period.  
(b) Determine the time period of a pendulum with a length of 0.6m, that swings on Mercury where gravitational field strength is  $3.73 \text{ m/s}^2$ .
- Q-4. (a) Define total internal reflection, explain how the critical angle is determined, and list the conditions necessary for it to take place.  
(b) An optical fiber made of flint glass (refractive index 1.66) is surrounded by crown glass (refractive index 1.52), Find the critical angle.
- Q-5. (a) What is capacitance? Derive the formula for the effective capacitance in parallel combination.  
(b) Two capacitors of  $4\mu\text{F}$  and  $6\mu\text{F}$  are connected in parallel through a voltage source of 100 V. Calculate the total capacitance and charge on each capacitor.
- Q-6. (a) What is an AC generator? Explain its working principle and construction.  
(b) If the current through the primary coil changes from -6 A to +4 A in 0.07 s, such that the induced emf is 1.4 V. Find the mutual inductance.