



Class No. : .....

**2024**

Name : .....

**SECOND YEAR HIGHER SECONDARY  
SECOND TERMINAL EXAMINATION, DECEMBER-2022**

Part – III

Time : 2 Hours

**PHYSICS**

Cool-off time : 15 Minutes

Maximum : 60 Scores

**General Instructions to Candidates :**

- There is a 'Cool-off time' of 15 minutes in addition to the writing time.
- Use the 'Cool-off time' to get familiar with questions and to plan your answers.
- Read questions carefully before answering.
- Read the instructions carefully.
- Calculations, figures and graphs should be shown in the answer sheet itself.
- Malayalam version of the questions is also provided.
- Give equations wherever necessary.
- Electronic devices except non-programmable calculators are not allowed in the Examination Hall.

**വിദ്യാർത്ഥികൾക്കുള്ള പൊതുനിർദ്ദേശങ്ങൾ :**

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ 15 മിനിറ്റ് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും.
- 'കൂൾ ഓഫ് ടൈം' ചോദ്യങ്ങൾ പരിചയപ്പെടാനും ഉത്തരങ്ങൾ ആസൂത്രണം ചെയ്യാനും ഉപയോഗിക്കുക.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- നിർദ്ദേശങ്ങൾ മുഴുവനും ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നല്കിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഠാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.



**Answer any 5 questions from question Nos. 1 to 7. Each question carries 1 score.**

**5 × 1 = 5**

1. The S.I. unit of charge is \_\_\_\_\_.
2. Work done in moving a charge of +3 C on an equipotential surface of 6 V is \_\_\_\_\_.  
(a) 3 J (b) 6 J  
(c) 18 J (d) 0 J
3. Resistance of a conductor \_\_\_\_\_ with temperature.  
(a) does not change (b) increases (c) decreases
4. Work done by magnetic Lorentz force on a moving charge in a magnetic field is always \_\_\_\_\_.  
(a) +ve (b) -ve (c) zero
5. The net magnetic flux through any closed surface is zero. This law is called \_\_\_\_\_.
6. Lenz's law is in accordance with law of conservation of \_\_\_\_\_.
7. In a capacitor only AC circuit the circuit current \_\_\_\_\_.  
(a) leads the applied voltage by 180°  
(b) lags the applied voltage by 180°  
(c) leads the applied voltage by 90°  
(d) lags the applied voltage by 90°

**Answer any 5 questions from 8 to 14. Each carries 2 scores.**

**5 × 2 = 10**

8. Write any two properties of electric charge.
9. Define electric dipole moment. Give its direction.
10. State Kirchhoff's junction rule.
11. How do you convert a galvanometer into an ammeter? Explain.
12. What are the energy losses in a transformer?



13. What is displacement current ? Give its equation.
14. Two charges of  $+2 \mu\text{C}$  and  $-5 \mu\text{C}$  are kept 2 cm apart in air. Find the electric potential at the midpoint of the line joining the charges.

**Answer any 6 questions from 15 to 21. Each carries 3 scores.**

**$6 \times 3 = 18$**

15. Find an expression for electric field intensity due to electric dipole on its equatorial line. Draw a neat diagram of the case.
16. A capacitor marked  $10 \mu\text{F}$ , 25 V is charged by connecting it to a voltage of 10 V. Find the energy stored in the capacitor. Where do capacitors store energy ?
17. Define drift velocity. Derive the expression connecting drift velocity and current.
18. List any three properties of dia, para and ferro magnetic materials.
19. What is motional emf ? Derive an expression for it.
20. A circular coil of wire consisting of 100 turns, each of radius 8.0 cm carries a current of 0.40 A. What is the magnitude of the magnetic field at the centre of the coil ?
21. What is capacitive reactance ? Show its variation with frequency of the AC in a graph.

**Answer any 3 questions from 22 to 25. Each carries 4 scores.**

**$3 \times 4 = 12$**

22. If two copper plates, each of area 'A' are kept parallel at a distance 'd' apart in air, it's a parallel plate capacitor.
- (a) Define capacitance of this arrangement. (1)
- (b) Derive a formula for the capacitance of this capacitor. (2)
- (c) How capacitance changes if the distance between the plates doubled ? (1)
23. Electric field lines are used for representing electric field.
- (a) List two important properties of electric field lines. (2)
- (b) Draw electric field line representing
- (i) uniform electric field. (1)
- (ii) electric field of an electric dipole. (1)



24. Four resistors connected in a particular way makes, Wheatstone's bridge.
- Show Wheatstone's bridge of resistors in a figure. (1)
  - Write Kirchhoff's loop rule, in two equations, as used in this bridge. (2)
  - Arrive at the balancing condition of the bridge in terms of resistors. (1)
25. With a diagram and necessary theory explain the working of A.C. generator.

Answer any 3 questions from 26 to 29. Each carries 5 scores.

$3 \times 5 = 15$

26. Gauss's theorem connects the electric flux and the electric charge that produces the flux.
- State Gauss's theorem and write an equation showing it. (2)
  - With a diagram, derive the equation for the electric field due to a charged conducting wire. (3)
27. Capacitors, resistors and inductors are connected in series in many applications.
- Show a series LCR circuit in a figure. (1)
  - Using phasor diagram, find the formula for current of this circuit. (2)
  - Obtain expression for its impedance. (1)
  - What is power factor of this circuit? (1)
28. Biot Savart's law gives the magnetic field produced by electric current.
- State Biot-Savart's law. Explain the symbols used. (2)
  - Using Biot-Savart's law, find the magnetic field due to a circular coil with current on its axial line. (3)
29. Electric potential is used for explaining strength of electric field.
- Define electric potential at a point in an electric field. (1)
  - Obtain the potential due to an electric dipole at a distance 'r' away from its center. (3)
  - How is electric field intensity related to electric potential? (1)