Reg. No. : .....

Name : .....

SY-524

SECOND YEAR HIGHER SECONDARY EXAMINATION, MARCH 2023

Part – III

PHYSICS

Maximum : 60 Scores

Time : 2 Hours

Cool-off time : 15 Minutes

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 പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

SECTION – A

Answer any 5 questions from 1 to 7. Each carries one score. **(5 × 1 = 5)**

1. State true or false :
   Two field lines never intersect.

2. The SI unit of resistance is _____.

3. Current loop behaves as a _____.
   (Magnetic dipole/Electric dipole)

4. An accelerating charge produces _____ waves.
   (a) electric (b) magnetic
   (c) electromagnetic (d) None of these

5. When the speed of light is independent of direction, the secondary waves are _____.
   (a) Spherical (b) Cylindrical
   (c) Plane (d) Rectangular

6. X-rays were discovered by _____ in 1895.
   (a) Roentgen (b) J.J. Thompson
   (c) William Crookes (d) Rutherford

7. Atoms of same element differing in mass are called _____.
   (a) Isotones (b) Isobars
   (c) Isotopes (d) Isomers

SECTION – B

Answer any 5 questions from 8 to 14. Each carries 2 scores. **(5 × 2 = 10)**

8. Define magnetisation. Give its dimension.

9. State laws of electromagnetic induction.

10. Obtain the expression for the current flowing through a resistor when an a.c. voltage is applied to it.

11. How Maxwell modified Ampere's law ?

12. What is total internal reflection ?

13. Explain work function.

14. Differentiate between nuclear fission and nuclear fusion.

SECTION – C

Answer any 6 questions from 15 to 21. Each carries 3 scores. **(6 × 3 = 18)**

15. Explain the basic properties of electric charge.

16. (a) Derive the expression for the capacitance of a parallel plate capacitor. **(2)**

    (b) What happens to the capacitance if a medium of dielectric constant K is introduced between the plates ? **(1)**

17. (a) State Biot-Savart law. **(1)**

    (b) Obtain the expression for the magnetic field on the axis of a circular current loop. **(2)**

18. Differentiate between paramagnetic, diamagnetic and ferromagnetic substances.

19. (a) State the principle of a.c. generator. **(1)**

    (b) Obtain the expression for the emf generated by an a.c. generator. **(2)**

20. Derive the expression for the refractive index of a prism with the help of a diagram.

21. Explain Rutherford's alpha particle scattering experiment.

SECTION – D

Answer any 3 questions from 22 to 25. Each carries 4 scores. **(3 × 4 = 12)**

22. (a) What is an electric dipole ? **(1)**

    (b) Obtain the expression for the electric field intensity at a point on the axial line of an electric dipole. **(3)**

23. (a) Derive the expression for the torque on a rectangular current loop in a uniform magnetic field with the help of a diagram. (2)

(b) A 100 turn closely wound circular coil of radius 10 cm carries a current of 3.2 A. What is the magnetic moment of this coil ? (2)

24. (a) With a neat diagram, derive lens makers formula. (2)

(b) The radii of curvature of the faces of a double convex lens are 10 cm and 15 cm. Its focal length is 12 cm. What is the refractive index of glass ? (2)

25. (a) Give the classification of materials based on energy band diagram. (3)

(b) Differentiate between intrinsic and extrinsic semiconductors. (1)

SECTION – E

Answer any 3 questions from 26 to 29. Each carries 5 scores. $(3 \times 5 = 15)$

26. (a) Give the relation between electric field and potential. (1)

(b) Derive the expression for the potential due to an electric dipole. (2)

(c) Calculate the potential at a point due to a charge of 4×10^{-7} C located 9 cm away. (2)

27. (a) State Kirchhoff's law. (2)

(b) Obtain the balancing condition of Wheatstone's bridge with the help of a diagram. (3)

28. (a) State the principle of a transformer. (1)

(b) Explain the working of a transformer. (2)

(c) Differentiate between step up transformer and step down transformer. (2)

29. (a) State Huygens principle. (2)

(b) Explain the refraction of plane wave using Huygens principle. (3)
