

Reg. No. :

Name :



SY-524

SECOND YEAR HIGHER SECONDARY EXAMINATION, MARCH 2023

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 'ക്യൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും.
- 'ക്യൂൾ 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 നൽകിയിട്ടുണ്ട്.
- 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 × 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)