SY-24

Reg. No. : .....

Name : .....

SECOND YEAR HIGHER SECONDARY
SECOND TERMINAL EXAMINATION, DECEMBER-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 '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.

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

1. Gauss's law in Electrostatics is applicable for (all surfaces/only closed surfaces)

2. Magnetic field at the centre of a current carrying solenoid along its axis is

   (a) $B = 0$ (b) $B = \frac{1}{2}\mu_0 ni$

   (c) $B = \mu_0 ni$ (d) $B = 2\mu_0 ni$

3. Which one of the following figures represents correct magnetic field ?

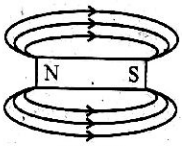


Fig. (a)

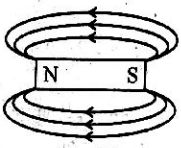


Fig. (b)

4. Unit of mutual inductance is _____.

5. The phase difference of current and voltage in a pure capacitive circuit is

   (a) 0° (b) 45°

   (c) 60° (d) 90°

6. The speed of electromagnetic wave is _____.

7. "The phenomenon of polarisation explains the transverse nature of light." State the statement is True or False.

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

8. Two capacitors of capacitances 2 μF and 4 μF are connected in series. What is its effective capacitance ?

9. Define mobility, give its SI unit.

10. Explain the torque on a magnetic dipole placed in a uniform magnetic field.

11. State laws of electromagnetic induction.

12. Electromagnetic spectrum consists of visible light, infrared rays, ultraviolet rays, γ-rays, X-rays and radio waves. Arrange them in the ascending order of their wavelength.

13. Draw the image formation at the near point of a simple microscope.

14. State Huygen's principle of wave theory.

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

15. Explain the behaviour of electric field outside, surface and inside of a charged shell.

16. What is dielectric polarisation ? Explain it with polar and non-polar molecules, give examples.

17. Compare dia, para and ferromagnetic substances with suitable examples.

18. How will you determine the power of ac circuit and explain power factor.

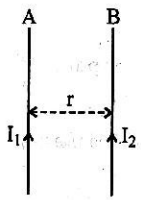
19. State and explain the displacement current.

20. Explain critical angle and total internal reflection.

21. What are coherent sources and how they can be produced ?

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

22. Two current carrying conductors are arranged as shown in figure :



(a) Derive the expression for force per unit length of the conductor. (3)

(b) Define SI unit of current. (1)

23. Coil carrying current acts as a bar magnet.

(a) Define self induction. (1)

(b) Derive the expression for self inductance of a solenoid. (3)

24. (a) What is a transformer ? Explain its different types. (2)

(b) Explain energy losses in a transformer. (2)

25. (a) Deduce lens makers' formula. (2)

(b) A double convex lens of radii curvatures 10 cm and 15 cm have a focal length of 12 cm. Find the refractive index of the material of the prism. (2)

Answer any 3 questions from 26 to 29. Each carries 5 scores. **(3 × 5 = 15)**

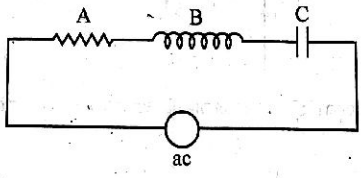
26. (a) The working principle of ac generator is _____. (1)

(b) Briefly explain the working of ac generator. (2)

(c) Draw the waveform output. (2)

27. (a) What is rms value of ac ? (1)

(b) Identify the components in ac circuit and draw its phasor diagram : (2)



(c) Obtain the impedance in the circuit. (2)

28. (a) State Snell's law in refraction. (1)

(b) Draw the path of a ray through a prism. (2)

(c) Derive an expression for refractive index of the prism. (2)

29. (a) What do you mean by polarisation ? (1)

(b) Write the expression for fringe width in interference pattern and mention each terms. (2)

(c) Distinguish between interference and diffraction. (2)