

No. of Printed Pages: 4

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12**SECOND REVISION EXAMINATION – FEBRUARY 2023****PART – III
PHYSICS**

Time Allowed : 3.00 Hours]

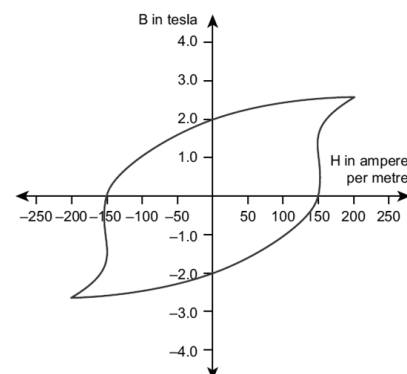
[Maximum Marks : 70

- Instructions :**
- (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.
 - (2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

PART – I

- Note :**
- (i) Answer **all** the questions. **15x1=15**
 - (ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. In India electricity is supplied for domestic use at 220 V. It is supplied at 110 V in USA. If the resistance of a 60W bulb for use in India is R, the resistance of a 60W bulb for use in USA will be
 - (a) R
 - (b) $\frac{R}{4}$
 - (c) 2R
 - (d) $\frac{R}{2}$
2. The value of Bohr magneton μ_B is :
 - (a) 9.27×10^{-24} Am
 - (b) 9.27×10^{24} Am⁻¹
 - (c) 9.27×10^{24} Am⁻²
 - (d) 9.27×10^{-24} Am²
3. LEDs are available in a wide range of colours. Which is indicate green Colour semiconductor?
 - (a) AlGaP
 - (b) GaAsP
 - (c) SiC
 - (d) GaInN
4. The BH curve for a ferromagnetic material is shown in the figure. The material is placed inside a long solenoid which contains 1000 turns/cm. The current that should be passed in the solenoid to demagnetize the ferromagnet completely is
 - (a) 1.00 mA
 - (b) 1.25 mA
 - (c) 1.50 mA
 - (d) 1.75 mA

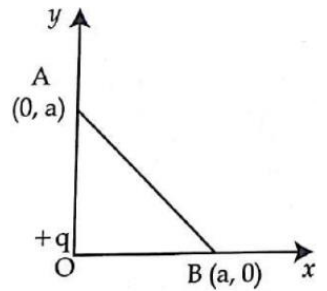


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5. For a healthy eye, the distance of the near point is
 (a) 30 cm (b) 20 cm (c) 35 cm (d) 25 cm
6. In a transformer, the number of turns in the primary and the secondary are 410 and 1230 respectively. If the current in primary is 6A, then that in the secondary coil is
 (a) 2 A (b) 18 A (c) 12 A (d) 1 A
7. If the magnetic monopole exists, then which of the Maxwell's equation to be modified?
 (a) $\oint \vec{E} \cdot d\vec{A} = \frac{Q_{\text{enclosed}}}{\epsilon_0}$ (b) $\oint \vec{E} \cdot d\vec{A} = 0$
 (c) $\oint \vec{E} \cdot d\vec{A} = \mu_0 I_{\text{enclosed}} + \mu_0 \epsilon_0 \frac{d}{dt} \int \vec{E} \cdot d\vec{A}$ (d) $\vec{E} \cdot d\vec{l} = -k \frac{d}{dt} \phi_B$
8. In the given diagram a point charge +q is placed at the origin O. Work done in taking another point charge - Q from point A to point B is:
 (a) $\frac{qQ}{4\pi\epsilon_0 a^2} \left(\frac{a}{\sqrt{2}}\right)$ (b) zero
 (c) $\left[\frac{-qQ}{4\pi\epsilon_0} \frac{1}{a^2}\right] \sqrt{2}a$ (d) $\left[\frac{qQ}{4\pi\epsilon_0} \frac{1}{a^2}\right] \sqrt{2}a$
9. The ratio of magnetic length and geometrical length is :
 (a) 0.833 (b) 0.633 (c) 0.933 (d) 0.733
10. Stars twinkle due to,
 (a) reflection (b) total internal reflection
 (c) refraction (d) polarisation
11. In a Young's double-slit experiment, the slit separation is doubled. To maintain the same fringe spacing on the screen, the screen-to-slit distance D must be changed to,
 (a) 2D (b) $\frac{D}{2}$ (c) $\sqrt{2}D$ (d) $\frac{D}{\sqrt{2}}$
12. The work functions for metals A, B and C are 1.92 eV, 2.0 eV and 5.0 eV respectively. The metal/metals which will emit photoelectrons for a radiation of wavelength 4100Å is/are
 (a) A only (b) both A and B (c) all these metals (d) none
13. If the nuclear radius of ^{27}Al is 3.6 fermi, the approximate nuclear radius of ^{64}Cu in fermi is
 (a) 2.4 (b) 1.2 (c) 4.8 (d) 3.6
14. If the input to the NOT gate is A = 1011, its output is
 (a) 0100 (b) 1000 (c) 1100 (d) 0011



15. The particle size of ZnO material is 30 nm. Based on the dimension it is classified as
 (a) Bulk material (b) Nanomaterial (c) Soft material (d) Magnetic material

PART - II

Note : Answer any six questions. Question No. 24 is compulsory. **6x2=12**

16. Define power of a lens and write its SI unit.
 17. State the properties of neutrino.
 18. Define electric dipole moment. Give its unit.
 19. Prove that the expression for power in an electrical circuit is $P = VI$.
 20. Derive the expression of de Broglie wavelength.
 21. Define Curie's law.
 22. Define RMS value of AC.
 23. What is called modulation?
 24. Light of wavelength of 5000 \AA produces diffraction pattern of the single slit of width $2.5 \mu\text{m}$. What is the maximum order of diffraction possible?

PART - III

Note : Answer any six questions. Question No. 33 is compulsory. **6x3=18**

25. The rod given in the figure is made up of two different materials



- Both have square cross sections of 3 mm side. The resistivity of the first material is $4 \times 10^{-3} \Omega\text{m}$ and that of second material has resistivity of $5 \times 10^{-3} \Omega\text{m}$. What is the resistance of rod between its ends?
26. Explain in detail how charges are distributed in a conductor.
 27. State and explain Biot - Savart law.
 28. Explain various energy losses in a transformer.
 29. Write the uses of X -rays and gamma rays.
 30. Define total internal reflection. What are the conditions to achieve total internal reflection?
 31. Distinguish between interference and diffraction.
 32. What are the constituent particles of neutron and proton?
 33. Calculate the de Broglie wavelength of a proton whose kinetic energy is equal to $81.9 \times 10^{-15} \text{ J}$. (Given: mass of proton is 1836 times that of electron).

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PART – IV

Note : Answer all the questions.

5x5=25

34. (i) Write down any six properties of electromagnetic wave.
(ii) Compute the speed of electromagnetic wave in a medium if the amplitudes of electric and magnetic fields in it are $3 \times 10^4 \text{ NC}^{-1}$ and $2 \times 10^{-4} \text{ T}$ respectively.

(OR)

Prove laws of refraction using Huygens' Principle.

35. Explain in detail the construction and working of Van de Graff generator.

(OR)

Derive the expression for radius and energy of the n^{th} orbit of hydrogen atom using Bohr atom model.

36. Obtain the condition for bridge balance in Wheatstone's bridge.

(OR)

Describe the Fizeau's method to determine speed of light.

37. Obtain a force between two long parallel current carrying conductors.

(OR)

Show mathematically that the rotation of a coil in a magnetic field over one rotation induces an alternating emf of one cycle.

38. Obtain Einstein's photoelectric equation with necessary explanation.

(OR)

Transistor functions as a switch. Explain.

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