

HSS

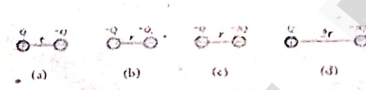
HALF YEARLY EXAMINATION - 2024**12** - Std**PHYSICS**

Time : 3.00 hrs.

Marks : 70

I CHOOSE THE BEST ANSWER :

15X1=15

- A rod of length 10 cm lies along the principal axis of a concave mirror of focal length 10 cm in such a way that its end closer to the pole is 20 cm from the mirror. The length of the image is,
 - 2.5 cm
 - 5cm
 - 10 cm
 - 15cm
- Rank the electrostatic potential energies for the given system of charges in increasing order.
 - 1=4<2<3
 - 2= 4<3<1
 - 2 =3<1<4
 - 3<1<2<4
- In J.J.Thomson e/m experiment, a beam of electron is replaced by that of muons (particle with same charge as that of electrons but mass 208 times that of less than the sum of the masses of all electrons). No deflection condition is achieved only if
 - B is increased by 208 times
 - B is decreased by 208 times
 - B is increased by 14.4 times
 - B is decreased by 14.4 times
- The vertical component of Earths magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place?
 - 30°
 - 45°
 - 60°
 - 90°
- In an electrical circuit, R, L, C and AC voltage source are all connected in series. When L is removed from the circuit, the phase difference between the voltage and current in the circuit is $\frac{\pi}{3}$. Instead, if C is removed from the circuit, the phase difference is again $\frac{\pi}{3}$. The power factor of the circuit is
 - $\frac{1}{2}$
 - $\frac{1}{\sqrt{2}}$
 - 1
 - $\frac{\sqrt{3}}{2}$
- First diffraction minimum due to a single slit of width 1.0×10^{-5} cm is at 45°. Then wavelength of light used is
 - 400 A°
 - 500 A°
 - 600 A°
 - 707 A°
- Two radiations with photon energies 0.9eV and 3.3 eV respectively are falling on a metallic surface successively. If the work function of the metal is 0.6 eV, then the ratio of maximum speeds of emitted electrons will be
 - 1 : 3
 - 1 : 4
 - 1 : 9
 - 1 : 1
- The barrier potential of a Germanium diode is approximately
 - 0.7 V
 - 0.3V
 - 2.0 V
 - 2.2V
- "Sky wax" is an application of nano product in the field of
 - Medicine
 - Textile
 - Sports
 - Automotive industry
- 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
 - R
 - 2R
 - $\frac{R}{4}$
 - $\frac{R}{2}$
- If the magnetic monopole exists, then which of the Maxwell's equation to be modified?
 - $\oint \vec{E} \cdot d\vec{A} = \frac{Q_{\text{enclosed}}}{\epsilon_0}$
 - $\oint \vec{E} \cdot d\vec{A} = 0$
 - $\oint \vec{E} \cdot d\vec{A} = \mu_0 I_{\text{enclosed}} + \mu_0 \epsilon_0 \frac{d}{dt} \int \vec{E} \cdot d\vec{A}$
 - $\oint \vec{E} \cdot d\vec{A} = -\frac{d}{dt} \phi_B$
- A parallel plate capacitor consist of two circular plates of radius 3cm separated by a dielectric material of thickness 0.5 mm and dielectric constant 4. Then capacitance of the capacitor is
 - 50 pF
 - 200 pF
 - 2 pF
 - 0.5 pF

13. The energy stored in a coil of inductance 5H and resistance 20Ω , when the emf applied to the coil is 100 volt
 a) 62.5 J b) 125 J c) 12.5 J d) 15.6 J
14. The half life of a radio active substance is 5 minutes. The amount of substance decayed in 20 minutes will be
 a) 93.75% b) 75% c) 25% d) 6.25%
15. In a transistor, the value of α is 0.99, then the value of β is
 a) 49 b) 90 c) 99 d) 9.9

II ANSWER ANY SIX QUESTIONS :QUESTION NO. 24 COMPULSORY:

6X2=12

16. Why are e.m. waves non-mechanical?
17. What is meant by quantisation of charges?
18. An electron and an alpha particle have same kinetic energy. How are the de Broglie wavelengths associated with them related?
19. What are near point and normal focusing?
20. State Fleming's left hand rule.
21. Mention the ways of producing induced
22. What are black holes?
23. The angle of minimum deviation for an equilateral prism is 37° . Find the refractive index of the material of the prism.
24. Two electric bulbs marked 20 W - 220 V and 100 W - 220 V are connected in series to 440 V supply. Which bulb will get fused?

III ANSWER ANY SIX QUESTIONS : QUESTION NO. 33 COMPULSORY:

6X3=18

25. Write short notes on (a) microwave (b) X - ray
26. Distinguish between drift velocity and mobility
27. Discuss about astronomical telescope.
28. Obtain the expression for energy stored in the parallel plate capacitor.
29. Derive the equation for effective focal length for lenses in contact.
30. State and prove De Morgan's First and Second theorems.
31. Derive an expression for de Broglie wavelength of electrons
32. A step-down transformer connected to main supply of 220 V is made to operate 11V,88W lamp. Calculate (i) Transformation ratio and (ii) Current in the primary.
33. Compute the binding energy of ${}^4_2\text{He}$ nucleus using the following data: Atomic mass of Helium atom, $M_A(\text{He})=4.00260$ u and that of hydrogen atom, $M_H = 1.00785$ u.

IV ANSWER ALL THE QUESTIONS:

5X5=25

34. Explain the construction and working of a full wave rectifier. (OR)
 Explain in detail Coulomb's law and its various aspects
35. Explain the determination of unknown resistance using meter bridge. (OR)
 Derive the mirror equation and the equation for lateral magnification.
36. Explain the Young's double slit experimental setup and obtain The equation for path difference (OR) Obtain a relation for the magnetic induction at a point along the axis of a circular coil carrying current.
37. Show mathematically that the rotation of a coil in a magnetic field over one rotation induces an alternating emf of cycle. (OR)
 How do we obtain characteristic x-ray spectra?
38. Derive the energy expression for hydrogen atom using Bohr atom model. (OR)
 Write down Maxwell equations in integral form.