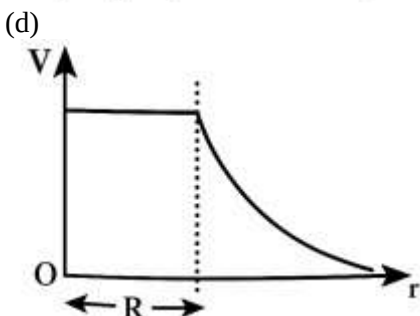
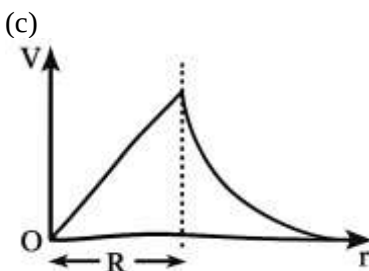
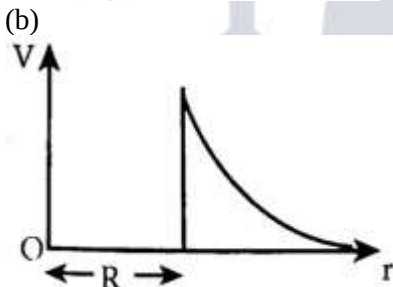
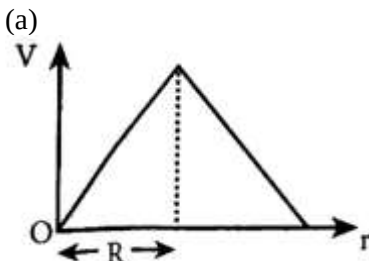


PART - I

- Calculate the distance upto which ray Optics is a good approximation for light of wavelength.
 - 20 cm
 - 25 m
 - 25 cm
 - 30 cm
- The transverse nature of light is shown in:
 - scattering
 - interference
 - polarisation
 - diffraction
- If a material having intensity of magnetisation 500Am^{-1} is placed in a magnetising field of 1000Am^{-1} , then the susceptibility of the material is :
 - 0.2
 - 0.8
 - 0.7
 - 0.5
- In a transformer, the number of turns in the primary and the secondary are 410 and 1230 respectively. If the current in primary is 6 A , then that in the secondary coil is :
 - 12 A
 - 2 A
 - 1 A
 - 18 A
- A thin conducting spherical shell of radius R has a charge Q which is uniformly distributed on its surface. The correct plot for electrostatic potential due to this spherical shell is :



- In photoelectric emission, a radiation whose frequency is 4 times threshold frequency of a certain metal is incident on the metal. Then, the maximum possible velocity of the emitted electron will be :

- (a) $2\sqrt{\frac{h\nu_0}{m}}$ (b) $\sqrt{\frac{h\nu_0}{m}}$
(c) $\sqrt{\frac{h\nu_0}{2m}}$ (d) $\sqrt{\frac{6h\nu_0}{m}}$

7. "Ski wax" is an application of nano product in the field of :

- (a) Sports
(b) Medicine
(c) Automotive industry
(d) Textile

8. An electric dipole is placed at an alignment angle of 30° with an electric field of $2 \times 10^5 \text{ NC}^{-1}$. It experiences a torque equal to 8 Nm . The charge on the dipole if the dipole length is 1 cm is :

- (a) 5 MC (b) 4 mC
(c) 7 mC (d) 8 mC

9. For light incident from air on a slab of refractive index 2, the maximum possible angle of refraction is :

- (a) 60° (b) 30°
(c) 90° (d) 45°

10. First diffraction minimum due to a single slit of width $1.0 \times 10^{-5} \text{ cm}$ is at 30° Then wavelength of light used is :

- (a) $600\text{\AA}$ (b) $400\text{\AA}$
(c) $700\text{\AA}$ (d) $500\text{\AA}$

11. To obtain sustained oscillation in an oscillator,

- (a) Feedback factor must be unity
(b) Phase shift must be 0 or 2π
(c) Feedback should be positive
(d) All the above

12. The dimension of $\frac{1}{\mu_0 \epsilon_0}$ is :

- (a) $[L^{-1} T]$ (b) $[LT^{-1}]$
(c) $[L^{-2} T^2]$ (d) $[L^2 T^{-2}]$

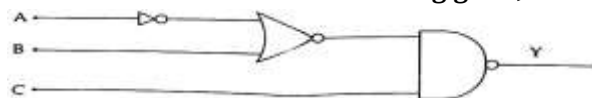
13. In Joule's heating law, when R and t are constant, if the H is taken along the y-axis and I^2 along the x-axis, the graph is :

- (a) circle (b) straight line
(c) ellipse (d) parabola

14. A radioactive element has N_0 number of nuclei at $t = 0$. The number of nuclei remaining after half of a half-life (that is, at time $t = \frac{1}{2} T_{1/2}$) is:

- (a) $\frac{N_0}{4}$ (b) $\frac{N_0}{2}$
(c) $\frac{N_0}{8}$ (d) $\frac{N_0}{\sqrt{2}}$

15. In the combination of the following gates, write the Boolean equation for output Y in terms of input A, B, C.



- (a) $\bar{A}\bar{B}\bar{C}$ (b) $\bar{A}\bar{B}C$
(c) $\bar{A} + \bar{B} + \bar{C}$ (d) $\bar{A} + B + \bar{C}$

PART – II

16. A parallel plate capacitor has two square plates of side 5 cm and separated by a distance of 1 mm . Calculate the capacitance of this capacitor.

17. State Lenz's law.

18. Write the limitations of Cyclotron.

19. What is mass defect? Give its expression.
20. What is optical path ?
21. What are the shapes of wavefront for a :
 (a) Source at infinite (b) Point source
 (c) Line source
22. Draw the circuit diagram for a forward biased p-n junction diode.
23. Define stopping potential.
24. A cell supplies a current of 0.9 A through a 2Ω resistor and a current of 0.3 A through a 7Ω resistor. Calculate the internal resistance of the cell.

PART - III

25. State Kinchhoff's current rule and voltage rule.
26. A radiation of wavelength 300 nm is incident on calcium surface. Will photoelectrons be observed? Justify your answer.
 (Work function of calcium = 3.20 eV)
27. Give an account of magnetic Lorentz force.
28. What are the advantages and disadvantages of Alternating Current System over Direct Current System ?
29. Write down the properties of electromagnetic waves. (Any six)
30. Obtain the relation between phase difference and path difference.
31. What are the differences between coulomb force and gravitational force?
32. Distinguish between intrinsic and extrinsic semiconductors.
33. Find the (i) Angular momentum (ii) Velocity of the electron revolving in the 5th orbit of hydrogen atom of radius 13.25 Å.

PART - IV

34. (a) Obtain the expression for electric field due to an infinitely long charged wire.
 OR
 (b) State and prove DeMorgan's first and second theorems.
35. (a) How the emf of two cells are compared using potentiometer?
 OR
 (b) Describe the Fizeau's method to determine the speed of light.
36. (a) Derive the expression for the torque on a current - carrying coil in a magnetic field.
 OR
 (b) Explain the construction and working of photo emissive cell and give any two applications of photo cell.
37. (a) (i) How will you induce an emf by changing the area enclosed by a coil ?
 (ii) A circular metallic disc of area 0.03 m^2 rotates in a uniform magnetic field of 0.4 T. The axis of rotation passes through the centre and perpendicular to its plane and is also parallel to the magnetic field. If the disc completes 20 revolutions in one second and the resistance of the disc is 4Ω , calculate the induced emf between the axis and the rim.
 OR
 (b) (i) State Brewster's Law.
 (ii) What is the angle at which a glass plate of refractive index 1.65 is to be kept with respect to the horizontal surface so that an unpolarised light travelling horizontal after reflection from the glass plate is found to be plane polarised ?
38. (a) Obtain the law of radioactive decay.
 OR
 (b) What is absorption spectrum? Explain the types of absorption spectrum.