

PART - A

- Which charge configuration produces a uniform electric field?
 - point charge
 - uniformly charged infinite line
 - uniformly charged infinite plane
 - uniformly charged spherical shell
- The temperature coefficient of resistance of a wire is $0.00125/^{\circ}\text{C}$. At 20°C , its resistance is 1Ω . The resistance of the wire will be 2Ω at.
 - 800°C
 - 700°C
 - 850°C
 - 820°C
- When the current changes from $+2\text{ A}$ to -2 A in 0.05 s , an emf of 8 V is induced in a coil. The co-efficient of self-induction of the coil is.
 - 0.2 H
 - 0.4 H
 - 0.8 H
 - 0.1 H
- Which of the following electromagnetic radiations is used for viewing objects through fog.
 - microwave
 - gamma rays
 - X- rays
 - infrared
- A plane glass is placed over a various coloured letters (violet, green, yellow, red) The letter which appears to be raised more is.
 - red
 - yellow
 - green
 - violet
- Emission of electrons by the absorption of heat energy is called ____ emission.
 - photoelectric
 - field
 - thermionic
 - secondary
- Atomic number of H-like atom with ionization potential 122.4 V for $n = 1$ is
 - 1
 - 2
 - 3
 - 4
- The barrier potential of a silicon diode is approximately,
 - 0.7 V
 - 0.3 V
 - 2.0 V
 - 2.2 V
- The unit of electric flux is
 - Nm^2C^{-1}
 - $\text{Nm}^{-2}\text{C}^{-1}$
 - NmC^2
 - Nm^{-2}C
- In an a.c circuir with an inductor _____.
 - voltage lags current by $\pi/2$
 - voltage and current are in phase
 - voltage leads current by π
 - current lags voltage by $\pi/2$
- Velocity of the electromagnetic waves through vacuum is _____.
 - $\sqrt{\mu_0\epsilon_0}$
 - $\frac{1}{\sqrt{\mu_0\epsilon_0}}$
 - $\sqrt{\frac{\mu_0}{\epsilon_0}}$
 - $\sqrt{\frac{\epsilon_0}{\mu_0}}$
- ${}^{14}_6\text{C} \rightarrow {}^{14}_7\text{N} + ? + \bar{\nu}$
 - e^+
 - e^-
 - 1_0n
 - ${}^4_2\text{He}$
- Of the following, the donor atoms are _____.
 - silicon and germanium
 - aluminium and gallium

- (c) antimony and arsenic
- (d) boron and indium

14. A circular coil of radius 5 cm and 50 turns carries a current of 3 ampere. The magnetic dipole moment of the coil is nearly.

- (a) 1.0Am^2 (b) 1.2Am^2
- (c) 0.5Am^2 (d) 0.8Am^2

15. Which one of the following is the natural nanomaterial.

- (a) Peacock feather
- (b) Peacock beak
- (c) Grain of sand
- (d) Skin of the Whale

PART – B

16. State loop rule.

17. A sample of HCl gas is placed in a uniform electric field of magnitude $3 \times 10^4 \text{ NC}^{-1}$. The dipole moment of each HCl molecule is $3.4 \times 10^{-30} \text{ Cm}$. Calculate the maximum torque experienced by each HCl molecule.

18. Define power factor.

19. Write down the integral form of modified Ampere's circuital law.

20. Differentiate interference and diffraction

21. Write the characteristics of photons.

22. Why do stars twinkle?

23. State and prove De Morgan's theorem .

24. What is robotics?

PART -C

25. Distinguish between Coulomb force and Gravitational force.

26. Explain the equivalent resistance of a parallel resistor network.

27. Write any six properties of cathode rays?

28. Calculate the instantaneous value at 60° , average value and RMS value of an alternating current whose peak value is 20 A.

29. Derive the relation between f and R for a spherical mirror.

30. Derive the expression of De Broglie wavelength of the electron.

31. How is galvanometer converted into a voltmeter ?

32. Explain how transistor acts as a switch.

33. Explain the pile of plates.

PART - D

34. (a) Deduce the relation for magnetic field at a point due to an infinitely long straight conductor carrying current.

OR

(b) Obtain the condition for bridge balance in wheatstone's bridge.

35. (a) Explain the spectral series of an hydrogen atom.

OR

(b) Obtain lens makers formula.

36. (a) What is emission spectra? Explain their types.

OR

(b) Draw the circuit diagram of a half wave rectifier and explain its working.

37. (a) Calculate the electric field due to a dipole on its axial line.

OR

(b) Give the construction and working of photo emissive cell.

38. (a) Derive an expression for electrostatic potential due to electric dipole.

OR

(b) Explain how an alternating emf will be induced by changing the orientation of the coil with respect to magnetic field .

