PART A

I ANSWER ALL THE FOLLOWING QUESTIONS   **10 X 1=10**

1. An electron and a proton are placed in a uniform electric field. Which one of these experiences greater acceleration?
2. Give the SI unit of current density.
3. What is the value of dip at earth's magnetic poles?
4. The current flowing in an inductive circuit is switched off. What will be the direction of induced current?
5. Mention any one advantage of AC over DC.
6. How are electromagnetic waves produced?
7. In a single slit diffraction experiment, the width of the slit is halved. How does it affect the central maximum of diffraction pattern?
8. Define amu.
9. Write an expression for the relation between half-life and mean life of a radioactive substance
10. What happens to the resistance of semiconductor when it is cooled?

PART B

II ANSWER ANY FIVE OF THE FOLLOWING QUESTIONS   **5 X 2=10**

11. What is equipotential surface? Draw equipotential surface for a unit positive charge.
12. Define a) mobility b) relaxation time of free electrons.
13. What are LC oscillations? Give an expression for the frequency of such oscillations.
14. Give the conditions for secondary maxima and minima of a diffraction pattern.
15. Write any two properties of photon.
16. State and explain Malus 'law.
17. Which semiconductor material is preferred for the making of a solar cell? Why?
18. Write the circuit symbol and truth table for OR gate.

PART C

III ANSWER ANY FIVE OF THE FOLLOWING QUESTIONS   **5 X 3 =15**

19. Derive the expression for equivalent capacitance of capacitors connected series.
20. Show that a bar magnet is equivalent to a current carrying solenoid.
21. Mention any three properties of diamagnetic substances.
22. Write the three energy losses in transformer.
23. Derive a relation between radius of curvature and focal length of a concave mirror.
24. Obtain the expression for wave length of de Broglie waves.

25. Mention three types of modulation.
26. Derive a condition for a charged particle moving in mutually perpendicular uniform magnetic and electric fields to move without any deviation.

PART D

IV ANSWER ANY TWO OF THE FOLLOWING QUESTIONS   2 X 5=10

27. Derive an expression for electric field at a point along the equatorial line of an electric dipole.
28. Deduce Ohm's law using $I=neAv_d$.
29 Derive an expression for the magnetic field at a point along the axis of a circular coil carrying current.

V ANSWER ANY TWO OF THE FOLLOWING QUESTIONS   2 X 5 = 10

30. Derive an expression for Len's maker's formula.
31. Draw binding energy curve and explain its significance.
32. With the help of a circuit diagram, explain the working of a full wave rectifier.

VI ANSWER ANY THREE OF THE FOLLOWING QUESTIONS   3 X 5 = 15

33. ABC is a right angled triangle where AB=25cm and BC= 60cm and $\angle ABC$. A metal sphere of 2cm radius charged to a potential of 9×10^5V is placed at B .Find the amount of work done in carrying a charge of 1C from C to A.
34 Two resistors of 3Ω and 6Ω are connected in parallel. This combination is connected in series with 8Ω resistor and a cell of emf 24V and internal resistance(r).The current flowing in 3Ω resistor is 0.8A. Calculate 1) current in 6Ω resistor 2) internal resistance (r) of the battery 3) terminal potential difference of battery.
35 A square coil of 10cm side and with 60 turns is rotated at a uniform speed of 500rpm about an axis at right angles to a uniform field of 0.5T. Calculate the maximum emf developed in the coil. What is the instantaneous value of emf, when the plane of the coil makes an angle of 30° with the magnetic field.
36. In Young's double slit experiment the distance between the slits is 1.2mm and the screen is 0.75m from the slits. If the distance of the 5th bright fringe from the central fringe on the screen is 1.8mm, calculate the wavelength of light used. What will be the distance of the 5th dark fringe from the centre of the screen.

37. The wavelength of H_α line of the Balmer series in hydrogen spectrum is $6563\overset{\text{o}}{A}$. Calculate the shortest and longest wavelength of Lyman series.