Answer any 5 questions from 1 to 7. Each carries 1 score. $(5 \times 1 = 5)$

1. The SI unit of electric flux
   - (a) NC^{-1}
   - (b) NmC
   - (c) Nm^2C^{-1} ✓
   - (d) Nm^2C

2. The net electric field inside a conductor when placed in an external electric field is
   - (a) Zero ✓
   - (b) Half
   - (c) Two times
   - (d) Four times

3. The SI unit of power of lens
   - (a) N
   - (b) J
   - (c) W
   - (d) D ✓

4. "The locus of points which have the same phase is called a wave front" the statement is
   True/False

5. The expression for de Broglie wavelength associated with a particle is _____

6. Which element in the periodic table shows maximum binding energy per nucleon ?

7. What is an intrinsic semiconductor ?

Answer any 5 questions from 8 to 14. Each carries 2 scores. $(5 \times 2 = 10)$

8. What is an equipotential surface ? Give an example.

9. Define drift velocity, give its equation.

10. State Gauss's law in magnetism. 0

11. What is magnetic flux and how is it measured ?

12. The household line voltage of ac measured is 220 V, calculate its peak voltage.

13. What is stopping potential ? V0

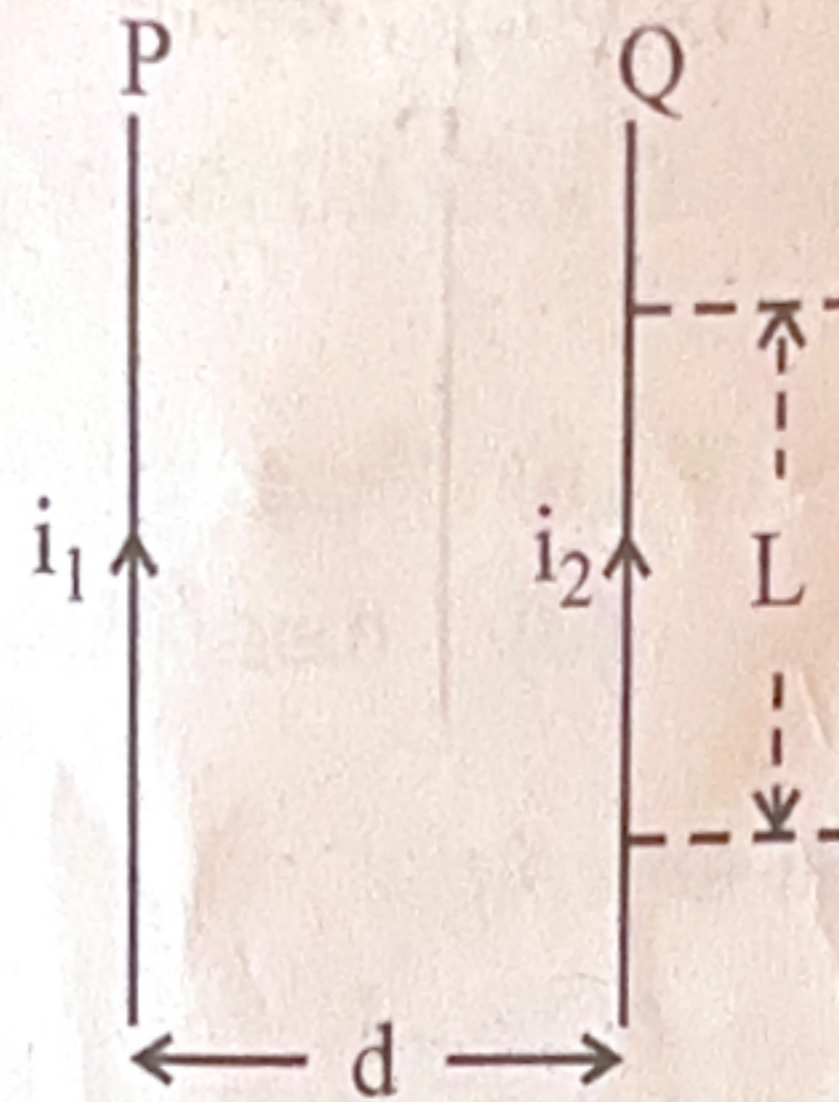14. What is nuclear fission ? Give one example.
    atom bombs.

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Answer any 6 questions from 15 to 21. Each carries 3 scores. $(6 \times 3 = 18)$

15. State and explain the force between electric charges.

    [handwritten: Coulomb law $q_1 q_2$, $4\pi\varepsilon_0 \dfrac{}{r^2}$]

16. Figure shows the two current carrying conductors. Derive the expression for force between the conductors.

    P   Q

    i_1 i_2 L

    ← d →

    [handwritten box: $\dfrac{F_{21}}{L} = \dfrac{\mu_0 I_2 I_1}{2\pi r}$]

17. Compare dia, para and ferromagnetic substances with suitable examples.

18. What is self-induction and define the expression for self-inductance of a solenoid.

    [handwritten: $L = \mu_0 n^2 lA$]

19. Briefly explain the electromagnetic spectrum.
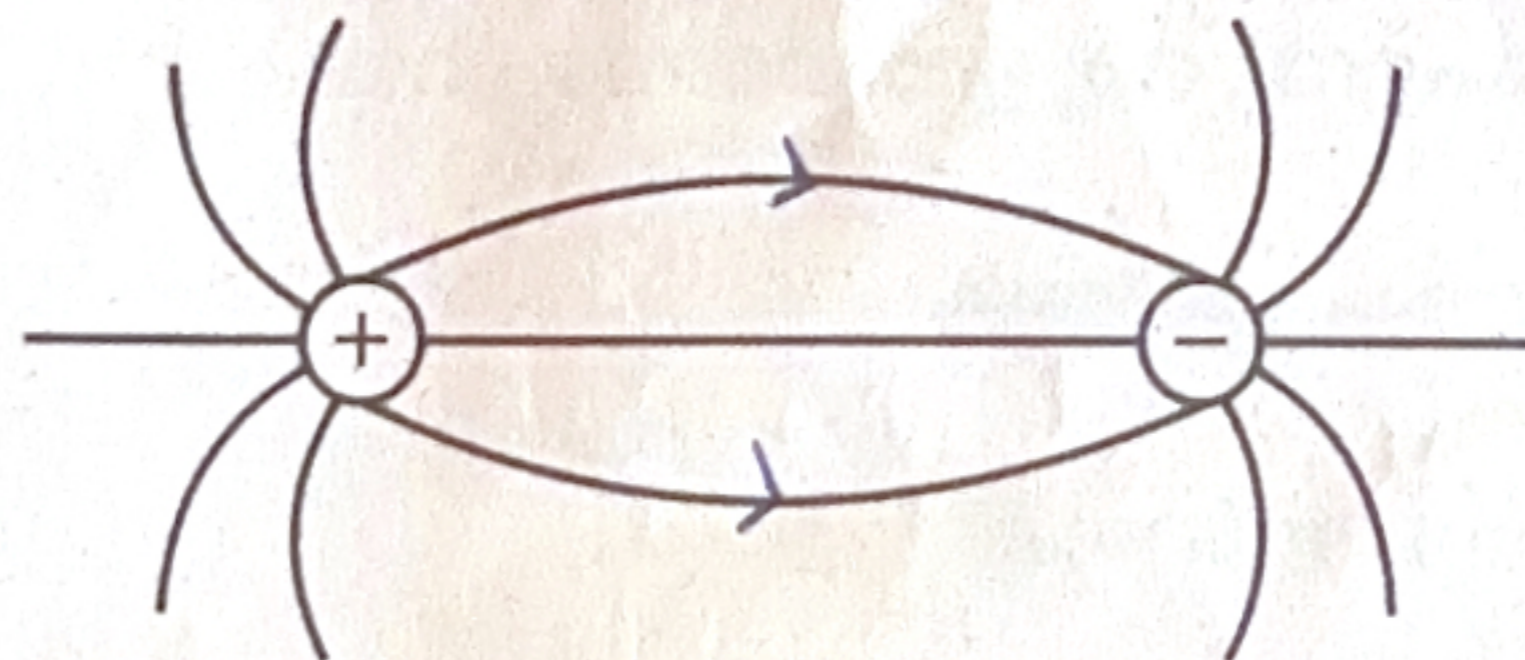
20. Write the postulates of Bohr's atom model.

21. What is a rectifier ? Draw the circuit diagram and input, output wave forms of a full wave rectifier.

Answer any 3 questions from 22 to 25. Each carries 4 scores. $(3 \times 4 = 12)$

22. (a) Complete the diagram with proper marking of direction. (1)

    [handwritten: $E = \dfrac{\lambda}{2\pi r \varepsilon_0}$]

    (b) Derive the expression for electric field intensity at a point from an infinitely long straight conductor carrying charge. (3)

23. (a) State Ohm's law. (1)

    (b) Derive Wheatstone's network principle. (3)

24. (a) State Snell's law of refraction. (1)

    (b) Explain critical angle and total internal reflection. $(1\frac{1}{2} + 1\frac{1}{2})$

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25. (a) What are coherent sources ? (1)
(b) In Young's double slit experiment, interference pattern is observed at 5 cm from the slits with a fringe width of 1 mm. Calculate the separation between the slits. (λ = 5000 Å) (3)

Answer any 3 questions from 26 to 29. Each carries 5 scores. (3 × 5 = 15)

26. (a) What is the principle of a capacitor ? (1)
(b) Derive the expression for capacitance of a parallel plate capacitor. (2)
(c) A 12 pF capacitor is connected to 50 V battery. How much electrostatic energy is stored in the capacitor ? (2)

15000×10^{-6}. $\cdot 015 \, J$

27. (a) The direction of magnetic field around a current carrying conductor is given by
_____. (1)
(b) State Biot-Savart law. (1)
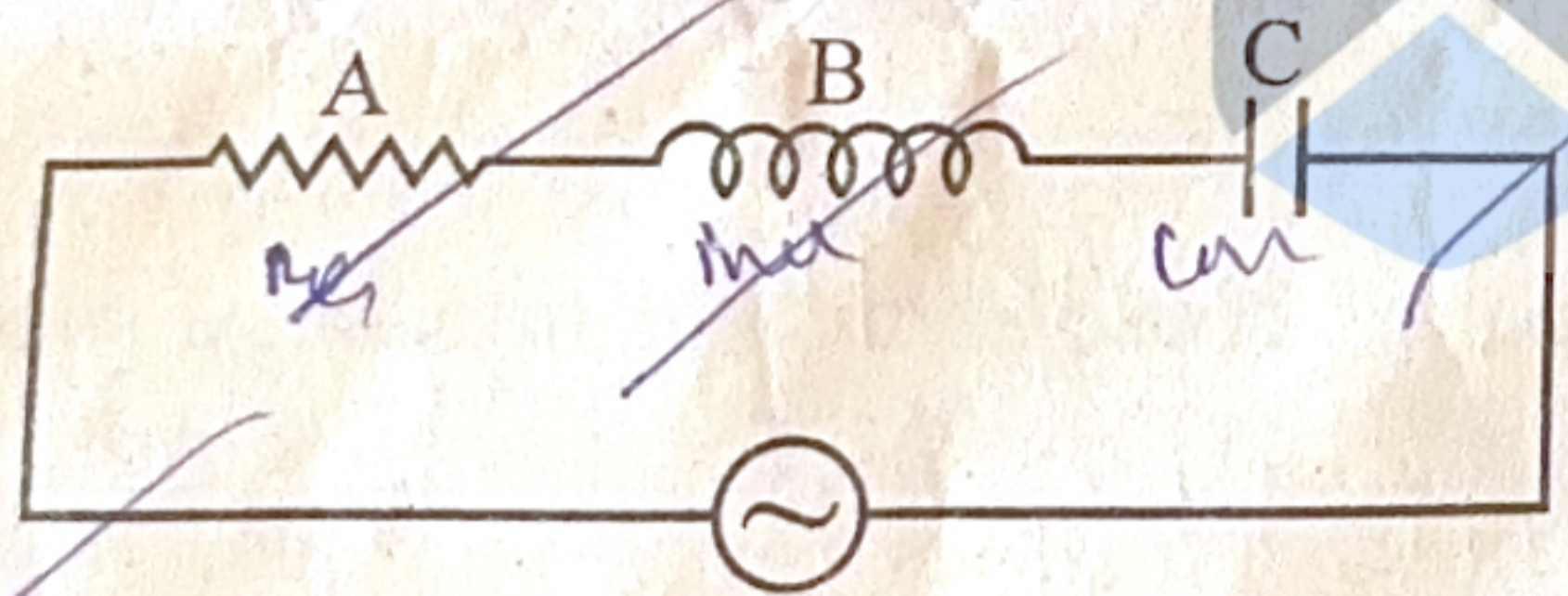(c) Derive the expression for magnetic field on the axis of a circular coil carrying current. (3)

$\dfrac{\mu_0 N I}{2a}$

$\varepsilon = d\phi/dt$

28. (a) Write the expression for instantaneous emf of a.c. (1)
(b) Identify A, B and C in figure. (1)

(c) Draw the phasor diagram of the above circuit and write the expression for impedance in the circuit, then mention the terms. (3)

29. (a) Derive lens maker's formula. (3)
(b) Draw the image formation in a simple microscope. (1)
(c) Write the value of least distance of distinct vision. (1)

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