Duration: 3 hrs 15 minutes   Max. **Marks: 70**

PART – A

(I)   Answer all the following questions :   **10 × 1 = 10**

1. Write the SI unit of electric field intensity.
2. Write the colour sequence for the carbon resistor 34 mega ohm 5% tolerance.
3. Does a static charge experience a force in magnetic field?
4. Define susceptibility.
5. Name the law which gives the polarity of induced emf.
6. What is wattless current?
7. When does light travel at the same speed in all directions in a medium?
8. How does the energy of an electron vary with its principal quantum number?
9. Write the logic symbol of NAND gate.
10. What is the bandwidth of an AM wave?

PART – B

(II)   Answer any Five of the following questions: **5 × 2 = 10**
11. State and explain Gauss' law.
12. The left gap of a meterbridge has resistance of 1Ω. What should be the resistance in the right gap to obtain balancing length of 25cm?
13. How do you convert a galvanometer into an voltmeter? Write the expression for shunt resistance in the case of an ammeter.
14. Define mutual inductance. Mention the factors on which it depends.
15. Mention any two charecteristics of electromagnetic waves.
16. For which colour of light, normal shift is (a) maximum, (b) minimum.
17. Mention any two applications of photocells.
18. Explain the formation of an energy band in a solid.

PART –C

(III)   Answer any Five of the following: **5 × 3 = 15**
19. Obtain an expression for potential energy of a dipole in an external uniform field.
20. Draw a neat diagram of a Vandegraff generator. Explain its principle and working.
21. State and explain Ampere's circuital law.
22. Obtain an expression for motional emf induced in a conductor.
23. Describe the mechanism of oscillations in an LC circuit.
24. Explain the working of a simple microscope and find an expression for its magnifying power.
25. What are matter waves? Obtain an expression for deBroglie wavelength of a particle.
26. What is a photodiode? Show graphically the V-I charecteristics of a photodiode.

PART – D

(IV)   Answer any Two of the following: **2 × 5 = 10**

27. Define electric dipole moment. Derive an expression for the electric field intensity at any point along the equatorial line of an electric dipole.

28. With the help of a circuit diagram, obtain the expression for equivalent capacitance of two capacitors connected in parallel.

29. Derive the expression for magnetic field at a point on the axis of a circular current loop.

(V)   Answer any Two of the following: **2 × 5 = 10**

30. State Brewster's law. Show that the reflected and refracted rays are perpendicular to each other, when the angle of incidence is equal to the polarising angle.

31. Assuming the expression for the radius of Bohr orbit, derive an expression for the energy of an electron in any orbit.

32. Explain the properties of Nuclear force.

PART –E

(VI)   Answer any Three of the following :   **3 × 5 =15**

33. When two capacitors are connected in series and connected across 1kV, the energy stored in the system is 2J. The same capacitors if connected in parallel across to same line, the energy stored is 9J. Find the capacitance of capacitors.

34. Resistors of 2Ω and 4Ω are connected in parallel and a resistor of 1Ω is connected in series with them. The combination is connected to a cell of emf 5V and internal resistance of 1Ω. Calculate the current through the 1Ω resistor.

35. A resistance of 600Ω, an inductor of 0.4H and a capacitor of 0.01μF are connected in series to an AC source of variable frequency. Find the frequency of AC source for which current in the circuit is maximum. Also calculate the bandwidth and quality factor for the circuit.

36. For a convex lens of focal length o.24m and of refractive index 1.33. Find the change in focal length of the lens.

37. Calculate the binding energy per nucleon in MeV of a lithium nucleus from the following data $^{7}_{3}Li$.

Mass of proton = 1.00783 amu

Mass of neutron =1.00867 amu

Mass of lithium nucleus = 7.01022 amu.

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