

[This question paper contains 4 printed pages.]

912

Your Roll No.

B.Sc. (Hons.) / II

C

CHEMISTRY – Paper XI

(Physics II)

Time : 3 Hours

Maximum Marks : 38

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

*Attempt five questions in all selecting
at least two from each Section.*

Q. No. 1 is compulsory.

1. Attempt any five of the following : (5×2=10)
- (a) What is dynamic load line and Q-point of a transistor ?
 - (b) Convert $(11101111.1011)_2$ into its decimal equivalent.
 - (c) Distinguish between diamagnetic, paramagnetic and ferromagnetic materials.
 - (d) What is the Maxwell's modification of Ampere's Circuital Law ?

P.T.O.

- (e) Why full wave bridge rectifier is preferred over a centre tap full wave rectifier ?
- (f) Subtract $(1011)_2$ from $(0110)_2$ using 2's complement.
- (g) Explain 'Barkhausen Criterion' for self-sustained oscillations.
- (h) Draw the circuit diagram for a XOR gate using NAND gate and give its truth table.

SECTION A

2. (a) State and prove Gauss's theorem in electrostatics. (3)
- (b) Define polarisation of a dielectric material. What is the relation between \vec{E} and \vec{D} in a polarised dielectric ? (2)
- (c) A certain electric potential function $V(x, y)$ is given by $V(x, y) = \frac{1}{x^2 + y^2}$, where 'V' is in volts and x and y are in centimetres. Find the magnitude of electric field intensity at point (1 cm, 2 cm). (2)

3. (a) State Biot-Savart's Law and use it to obtain an expression for the magnetic field due to a straight and finite wire carrying current. (5)
- (b) Explain how Lenz's law gives the direction of induced emf in a circuit. (2)
4. Write Maxwell's equations and solve them to obtain the velocity of the electromagnetic waves in a homogeneous isotropic dielectric medium. (7)

SECTION B

5. (a) Explain working of a full-wave rectifier with the help of a circuit the diagram. Obtain expressions for ripple factor and rectification efficiency. (5)
- (b) Discuss how a Zener diode regulates voltages with change in the load current in a circuit. (2)
6. (a) Give the hybrid model of a common emitter transistor circuit. (5)
- (b) Calculate the frequency of oscillation of a phase shift oscillator with
- $$R_1 = R_2 = R_3 = 2 \text{ M}\Omega \text{ and } C_1 = C_2 = C_3 = 70 \text{ pF.}$$
- (2)

7. (a) State and prove De-Morgan's theorems.

Simplify the expression $A\bar{B}\bar{C} + A\bar{B}C + ABC$ (3)

- (b) Draw and explain the circuit of Full-Subtractor and give its truth table. (4)