MCH33 — PHYSICAL CHEMISTRY — III

Time : Three hours   Maximum : 75 marks

SECTION A — (5 × 6 = 30 marks)

Answer ALL questions.

1. (a) Explain the significance of electron exchange current density.

Or

(b) Discuss the mechanism of the hydrogen and oxygen evolution reaction.
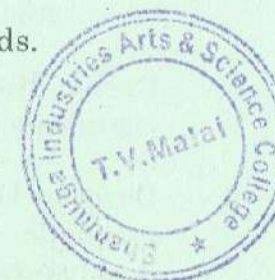
2. (a) Discuss the properties of solids.

Or

(b) Write a note on :

(i) Diezo electricity

(ii) Ferro electricity.

3. (a) Derive an expression for the frequency and wave number of lines in the rotational spectrum.

Or

(b) What are P, Q and R branch of rotation vibration spectra?

4. (a) Explain the NMR of simple AX and AMX type molecule.

Or

(b) Discuss the Fourier transformation Resonance Spectroscopy.

5. (a) Derive the basic equation given by Fermi-Dirac statistics.

Or

(b) Calculate the translational partition function for one mole of nitrogen at 2 atmosphere and $27°C$ assuming the gas to behave ideally.

SECTION B — $(3 \times 15 = 45$ marks)

Answer any THREE questions.

6. Derive Bulter-Volmer equation and explain its significance.

7. Describe Guoy's technique for the measurement of magnetic susceptibility and advantages and disadvantages of the method.

8. (a) Discuss the Franck Candon principle.

(b) The pure rotational spectrum of the gaseous molecule CN has a series of equally spaced lines separated by 3.7978 cm^{-1}. Calculate the internuclear distance of the molecule.

9. Write a note on :

(a) Coupling constant

(b) Spin-Spin coupling.

10. Discuss the application of Bose Einstein statistics to the thermodynamics of an ideal photon gas (radiation law).

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