

APRIL/MAY 2019

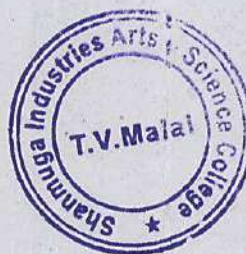
**MCH33 — PHYSICAL CHEMISTRY — III**

Time : Three hours

Maximum : 75 marks

SECTION A — (5 × 6 = 30 marks)

Answer ALL questions.



1. (a) Explain high field and low field approximation in Butler Volmer equation.

Or

- (b) What are fuel cells? Discuss the hydrogen-oxygen fuel cell.

2. (a) Explain Guoy method for the determination of magnetic susceptibility.

Or

- (b) Discuss the ferro electricity and piezo electricity.

3. (a) Discuss the Franck Condon principle.

Or

- (b) What type of vibrational-rotational spectra is obtained for a diatomic molecule taking it as anharmonic oscillator.



4. (a) What is chemical shift? What are the factors which will affect the chemical shift?

Or

- (b) Explain the application of  $^{19}\text{F}$  NMR spectroscopy.
5. (a) Compare Maxwell-Boltzmann, Bose Einstein and Fermi-Dirac statistics.

Or

- (b) Derive an expression for Translational partition function.



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

Answer any THREE questions.

6. Write a note on :
- (a) Pourbaix diagram.
- (b) Evan's diagram.
- (c) Mechanism of hydrogen and oxygen evolution reaction.
7. Discuss the mechanical and thermal properties of solids.
8. Describe rotation-vibration Raman spectrum obtained for a diatomic molecule.

9. Explain with an example for NMR spectra of AX and AMX type molecule.

10. (a) Derive Maxwell-Boltzmann distribution law equation.
- (b) Explain the application of Fermi-Dirac statistics for electron gas in metals.