



# MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)  
Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

## Department of Biotechnology Question Bank - Academic Year (2020-21)

Course Code & Course Name : 19BTD08 & Instrumental Methods of Analysis

Year/Sem/Sec : II/IV

### Unit-I: Introduction

#### Part-A (2 Marks)

1. Define Electromagnetic radiation and its properties?
2. What are wave properties and their types?
3. What are filters?
4. What are transducers or detectors?
5. Define wavelength selectors?
6. What are monochromators?
7. Define the terms: a) signal process; b) read outs.
8. Define sensitivity?
9. What is detection limit?
10. Expand FTIR and their principle?

#### Part-B (16 Marks)

1. Explain in detail about the components of optical instruments? (16)
2. Explain signal to noise ratio, with sensitivity and detection limit with examples?
3. What is noise and the different sources of noise?
4. Describe the principle and mechanism of Fourier Transform optical Measurements?
- 5.(i). Write a short note on hardware techniques for signal-to-noise enhancement? (8)
- (ii). Explain software techniques for signal-to-noise enhancement? (8)

### Unit-II :

#### Part-A (2 Marks)

1. What is measurement of absorbance with equation and example?
2. Define measurement of transmittance with equation and example?
3. What is the principle of AAS?
4. Define luminescence and the types of luminescence?
5. What is IR spectroscopy?

6. Define Raman spectroscopy with example?
7. What is the principle of Fluorescence spectroscopy with example?
8. What are the types of monochromators used in Fluorospectrophotometer and why?
9. What is singlet state and triplet state?
10. Define the principle of phosphorescence?

**Part-B (16 Marks)**

1. Explain in detail about Atomic Absorption Spectroscopy with applications?
2. Describe the importance of Fluorescence and Phosphorescence spectroscopy?
3. Write a short note on IR spectroscopy with applications?
4. Derive the equation of Beer-Lamberts Law?
5. Explain Raman spectroscopy with Applications?

**Unit-III :**

**Part-A (2 Marks)**

1. Define chemical shift with example?
2. Expand NMR and it's principle of NMR?
3. Name any 4 differences between  $^1\text{H}$  and  $^{13}\text{C}$  NMR?
4. Explain the environmental effect on NMR and their types?
5. Expand the terms: NMR, EPR, HPLC and GC?
6. Define the term 'g' values?
7. Define mass spectra?
8. Define mass spectrometry?
9. What are the types of ion sources?
10. Name some of the applications of MS?

**Part-B (16 Marks)**

1. Explain the principle, working and a neat instrumentation diagram of NMR with their applications?
2. Explain the principle, working and a neat instrumentation diagram of MS with their applications?
3. Explain the working and instrumentation with a neat diagram on EPR?
4. Explain chemical shift and types of NMR spectrometers?
5. Describe in detail the types of ion sources in NMR?

**Unit-IV :**

**Part-A (2 Marks)**

1. Define chromatography with a neat diagram and their different types?
2. Define capillary electrophoresis with a neat diagram?

3. Explain the term 'band broadening' in chromatography?
4. What is meant by optimization of column performance in chromatography?
5. Name some of the applications of GC?
6. Give some of the application used in capillary electrophoresis?
7. What are the types of liquid chromatography?
8. Define size-exclusion chromatography with suitable diagram?
9. What are the components of HPLC?
10. What is the principle of Ion-exchange chromatography?

**Part-B (16 Marks)**

1. Explain the principle, working and a neat instrumentation diagram of HPLC with their applications?
2. Explain the principle, working and a neat instrumentation diagram of GC with their applications?
3. Explain in detail about the adsorption, ion-exchange and affinity chromatography with neat diagrams?
4. Explain the principle, working and a neat instrumentation diagram of HPLC with their applications?
5. Explain partition and size-exclusion chromatography with neat diagrams?

**Unit-V :**

**Part-A (2 Marks)**

1. Define electrochemical cell?
2. What is electrode potential?
3. Describe the term 'Potentiometry'?
4. Explain the term 'reference electrode' and their types?
5. Define voltammetry?
6. Name some of the applications of voltammetry?
7. What is study of surfaces?
8. Expand the terms 'AFM' and 'STM'?
9. Define scanning probe microscopes?
10. Give some of the applications of scanning probe microscopes?

**Part-B (16 Marks)**

1. Explain in detail about the electrochemical cells and electrode cell potential with suitable diagrams?
2. Explain in detail about the instrumentation of potentiometry with suitable diagrams?
3. Explain in detail about reference electrode and their types with suitable diagrams?
4. Explain in detail about voltammetry and their types with suitable diagrams and mention some of the applications?
5. Describe in detail about the types of scanning probe microscopes with suitable

diagrams for study of surfaces?

**Course Faculty**

**HoD**