

**QP Code : 75516**

**(3 Hours)**

**[Total Marks : 75**

- N.B. (1) All questions are **compulsory**.  
(2) All questions carry **equal marks**.  
(3) Attempt **ant one** questions from (b) and (c).  
(4) Attempt **ant one** questions from (d) and (e).  
(5) Draw **neat labeled diagram** wherever necessary.

1. (a) Attempt any **TWO** of the following:- 4  
(i) Explain the term chemical shift.  
(ii) Explain MALDI – TOF – Mass spectrometry.  
(iii) Give principle of IR spectroscopy.  
(iv) Give principle of UV and Visible spectroscopy.
- (b) Discuss detail instrumentation and applications of Atomic absorption spectrophotometry. 5  
**OR**
- (c) What is NMR spectroscopy, explain its importance in biochemical research. 5
- (d) What are methods to detect conformational changes of protein? Discuss any one method in detail with applicants. 6  
**OR**
- (e) Discuss instrumentation and application of circular Dichroism spectroscopy. 6
2. (a) Attempt any **two** of the following:- 4  
(i) What are colloids? Classify them.  
(ii) State the principle of sedimentation.  
(iii) Give factors affecting viscosity.  
(iv) Explain the relevance of viscosity to biological systems.
- (b) “ Surface tension is affected by various factors”. Discuss it and give applications of Surface tension. 5  
**OR**
- (c) Explain rate zonal and isopycnic centrifugation. Give significant difference between the two. 5
- (d) Give the principle, instrumentation and application of microcalorimetry. 6  
**OR**
- (e) Discuss characteristics of absorption. Give its application and physiological importance. 6

(TURN OVER)

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3. (a) Attempt any **two** of the following:- 4
- Give different supporting media used in electrophoresis. State their merits and demerits.
  - Give principle of capillary electrophoresis.
  - Biological activity of most biomolecules is pH dependent, Justify
  - Define buffer and explain how does it works?
- (b) What is PULSE FIELD gel electrophoresis? Discuss the technique and its applications. 5
- OR**
- (c) What is ampholyte? Describe principle, technique and applications of isoelectric focusing. 5
- (d) What is the Bronsted concept of conjugate acid and conjugate base pairs? Explain ionization of water. Discuss dissociation constant. 6
- OR**
- (e) Describe principle, technique and applications of immunoelectrophoresis. 6
4. (a) Attempt any **two** of the following:- 4
- Give the principle and applications of Affinity Chromatography.
  - What is half life of  $P^{32}$ ,  $N^{15}$  and  $S^{35}$  and state their applications.
  - Explain the role of carrier gas in GLC.
  - State principle of TLC.
- (b) Give technique and application of HPLC. 5
- OR**
- (c) Discuss instrumentation and applications of gel permeation chromatography. 5
- (d) Describe instrumentation, technique and applications of scintillation counters. 6
- OR**
- (e) Discuss autoradiography and its applications. 6
5. (a) Attempt any **two** of the following:- 4
- Give principle of phase contrast microscopy.
  - State principle of Neutron activation analysis.
  - How fluorescence microscopy used in research.
  - What is principle of inductivity coupled plasma emission spectroscopy.
- (b) Describe principle, technique and applications of Atomic force microscopy. 5
- OR**
- (c) How turbidometry is different from Nephelometry. Discuss principle and applications. 5
- (d) What is potentiometry. Describe the technique and give its applications. 6
- OR**
- (e) Give detail instrumentation and application of confocal microscopy. 6