



Name : .....  
Roll No. : .....  
Invigilator's Signature : .....

**CS/B.SC(H)(BT/GE/MICRO/MOL)/SEM-1/BPI-102/2011-12**

**2011**

**BIOPHYSICS AND INSTRUMENTATION**

*Time Allotted : 3 Hours*

*Full Marks : 70*

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

**GROUP - A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

- i) A barrier filter is present in the
- a) phase contrast microscope
  - b) fluorescence microscope
  - c) compound microscope
  - d) scanning electron microscope.
- ii) The molecule which is not Raman active is
- a) CO<sub>2</sub>
  - b) CH<sub>3</sub>Cl
  - c) H<sub>2</sub>O
  - d) none of these.
- iii) During centrifugation, if two particles have the same mass but their shapes are different, they will sediment at
- a) different rates
  - b) medium rate
  - c) same rate
  - d) relative rate.



- iv) The mathematical expression of sedimentation coefficient is
- a)  $s = v/\omega 2r/v$                       b)  $s = r/\omega 2v$   
 c)  $s = \omega 2r/v$                               d)  $s = \omega 2/rv$ .
- v) Beer-Lambert's law states that
- a)  $\log I_0/I = abC$                       b)  $E = hv$   
 c)  $\log I/I_0 = abC$                       d)  $v = 1/2\Pi$ .
- vi) X-ray spectroscopy tells about
- a) functional group                      b) electronic state  
 c) bond length and angle              d) none of these.
- vii) The limit of  $R_f$  value is between
- a) 0 – 1.00                                  b) 0 – 0.5  
 c) 0 – 2.0                                      d) 0 – 10.
- viii) Separation depends on charge and mass both in
- a) Chromatography                      b) electrophoresis  
 c) NMR    d) centrifugation.
- ix)  $^1\text{H}$  nucleus has spin quantum no
- a)  $1/2$     b) 1  
 c)  $3/2$     d) 2.
- x) In SEM the electrons collected by detector are
- a) scattered                                  b) transmitted  
 c) both    d) confocal microscopy.



- xi) In NMR, relaxation means
- a) spin-spin relaxation
  - b) Spin-lattice relaxation
  - c) both
  - d) none of these.
- xii) The solubilizer which breaks hydrogen bonding is
- a) CTAB
  - b) Urea
  - c) SDS
  - d) none of these.

### GROUP - B

#### ( Short Answer Type Questions )

Answer any *three* of the following.

3 × 5 = 15

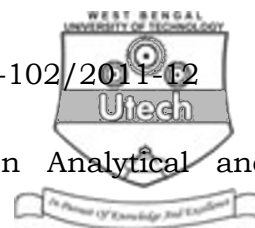
2. Explain the High Performance Liquid Chromatography techniques briefly.
3. What are the advantages of 2D-PAGE over 1D-PAGE.
4. Differentiate between bathochromic shift and hypochromic shift? What is chromophore? 3 + 2
5. What is Chemical Shift? Measurement of Chemical shift. 2 + 3
6. Explain the various applications of electronic spectroscopy.

### GROUP - C

#### ( Long Answer Type Questions )

Answer any *three* of the following. 3 × 15 = 45

7. a) What is the basic principle of Sedimentation?  
b) Factors affecting Sedimentation velocity.



- c) Write down the difference between Analytical and Preparative centrifugation.
- d) What is sedimentation coefficient and factors affecting sedimentation coefficient 3 + 4 + 4 + 4
8. What is the basic principle of Chromatography ? Why Partition coefficient important factor chromatographic techniques ? Describe the principle of Gel Filtration and Affinity Chromatography. Give the applications of both the techniques. How is paper chromatography different from Thin layer chromatography ? 2 + 2 + 4 + 4 + 3
9. What is SDS-PAGE technique ? Why SDS use in Gel electrophoresis ? Write the role of isoelectric point in isoelectrofocusing. Write the application of Immunoelectrophoresis. Explain briefly about Scintillation detection techniques. 2 + 2 + 3 + 3 + 5
10. Describe the method of determination of pH by glass electrode. What is the advantages of glass electrode ? Explain autoradiography. Briefly describe the measurement of radioactivity by Geiger-Muller counter. 5 + 4 + 6
11. Write down the Principle of NMR Spectroscopy. Describe the Shielding and Deshielding effect of NMR spectroscopy. Briefly explain Boundary electrophonsis. 5 + 5 + 5
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