



Name :

Roll No. :

Invigilator's Signature :

CS/B.SC(H)/MOL.BIO/BT/MICRO-BIO/GE/SEM-1/BPI-102/2012-13

2012

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) The resolution power of electron microscope is
 - a) 0.1 cm to 0.01cm
 - b) 100 nm to 1 nm
 - c) 1 mm to 0.1 nm
 - d) 1 μm to 0.1 nm.

- ii) In SEM the electrons collected by detector are
 - a) Scattered
 - b) Transmitted
 - c) Both (a) and (b)
 - d) Confocal microscopy.

- iii) In Rayleigh scattering incident and emitted wavelength are
 - a) equal
 - b) not equal
 - c) incident > emitted
 - d) incident < emitted.



- iv) High speed centrifuge generally used for separation of
- | | |
|-----------------|------------------|
| a) nuclei | b) lysosome |
| c) mitochondria | d) all of these. |
- v) For CH_3Cl , the possible electronic transition is
- | | |
|-------------------------------|---------------------------------|
| a) $n \rightarrow \pi^*$ | b) $n \rightarrow \sigma^*$ |
| c) $\sigma \rightarrow \pi^*$ | d) $\pi \rightarrow \sigma^*$. |
- vi) Weak cation exchanger contains functional group
- | | |
|---------------------------|--------------------|
| a) $-\text{SO}_3\text{H}$ | b) $-\text{COOH}$ |
| c) $-\text{NH}_2$ | d) $-\text{NHR}$. |
- vii) Armor chamber is used in
- | | |
|-----------------------|--------------------------|
| a) desktop centrifuge | b) High speed centrifuge |
| c) Ultracentrifuge | d) all of these. |
- viii) How many absorptions will the following compound have in its carbon N.M.R spectrum ?
 $(\text{H})(\text{CH}_3\text{CH}_2\text{CH}_2)\text{C} = \text{C}(\text{CH}_2\text{CH}_3)(\text{CH}_3)$
- | | |
|------|-------------------|
| a) 3 | b) 5 |
| c) 6 | d) None of these. |
- ix) Tau is a unit of
- | | |
|--------------------|-------------------|
| a) Crystallography | b) Raman shift |
| c) Chemical shift | d) None of these. |
- x) Order of stretching frequency of these bonds C-H, C-F and C-Br is
- | | |
|--|--|
| a) $\text{C-H} > \text{C-F} > \text{C-Br}$ | b) $\text{C-H} < \text{C-F} > \text{C-Br}$ |
| c) $\text{C-H} > \text{C-F} < \text{C-Br}$ | d) $\text{C-H} < \text{C-F} < \text{C-Br}$. |
- xi) Stokes line means
- | |
|--|
| a) Molecule has lost energy to the incident radiation |
| b) Molecule absorbs energy from the incident radiation |
| c) Both of these |
| d) None of these. |



xii) ZnS is an example of

- a) Cubic lattice b) Monoclinic lattice
c) Triclinic lattice d) Hexagonal lattice.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

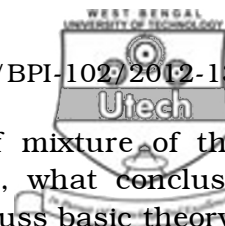
2. Write basic principle of HPLC. What is the role of guard column. 3 + 2
3. What is polarisability ? Write selection rule for Raman effect. 3 + 2
4. What is limit of resolution ? What are advantages of using oil immersion technology microscopy ? 2 + 3
5. What are H-NMR used in determination of the structure of biomolecules. What are shielding and deshielding effects ? Explain by example. 2 + 3
6. Schematically represent the process of autoradiography. 5

GROUP – C

(Long Answer Type Questions)

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

7. What are Stokes and anti-Stokes lines in Raman spectra ? Why are Stokes more intense ? Give instrumental details of Raman spectra. Why detector is in 90° to the sample container ? Write different vibrational modes of carbon dioxide. Which one is Raman active ? 3 + 3 + 4 + 2 + 2 + 1



8. Discuss gel filtration chromatography. If mixture of three components gives two peaks in detector, what conclusion can you draw about their structure ? Discuss basic theory of affinity chromatography. Write the role of arm in affinity chromatography. Write the criteria of matrix in column chromatography. $5 + 3 + 3 + 2 + 2$
9. What is 2D electrophoresis ? What is its advantage ? Write application of immunoelectrophoresis. Explain apparatus details in gel electrophoresis. What is the advantage of slab over column ? Write the role of isoelectric point in isoelectro-focussing. $2 + 2 + 2 + 3 + 3 + 3$
10. Draw the diagram of a scanning electron microscope. Why the main chamber is to be kept air free or vacuum ? Write down the sample preparation procedure in TEM. What is the limit of resolution ? What is florescence microscopy ? $4 + 2 + 6 + 1 + 2$
11. (i) Describe the method of determination of pH by glass electrode. Write the disadvantages of hydrogen electrode
- (ii) Describe the method of thin layer chromatography with diagram.
- (iii) Briefly explain Boundary electrophoresis. $4 + 2 + 5 + 4$

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