

[22/24]

SARDAR PATEL UNIVERSITY
M.Sc (I Semester) Examinations
Thursday, 12th April, 2018
10.00 am to 1.00 pm
PS01CBIT02/PS01CBIC02 – Bioinstrumentation

Total marks: 70

1. Choose the correct answer.

(8X1=8)

- i) To determine the location of a specific protein in a cell using a colored stain, Which of the following is the best technique for this purpose?
- | | |
|------------------------------|----------------------------|
| a) electron microscopy | c) bright-field microscopy |
| b) phase contrast microscopy | d) dark-field microscopy |
- ii) Three dimensional image is possible with
- | | |
|------------------------------|------------------------|
| a) Fluorescence microscope | c) Confocal microscope |
| b) Phase contrast microscope | d) None of the above |
- iii) In 2-D gel electrophoresis the separation of proteins in first dimension is based on
- | | |
|----------------------|----------------------|
| a) Molecular weight | c) Isoelectric point |
| b) Charge mass ratio | d) None of the above |
- iv) In rate zonal centrifugation sedimentation velocity depends primarily on
- | | |
|------------------|----------------------|
| a) Size and mass | c) Buoyant density |
| b) Density | d) None of the above |
- v) What is the name of an instrument used to measure the absorbance of a coloured compound in solution?
- | | |
|----------------|----------------------|
| a) Coulometer | c) Calorimeter |
| b) Colorimeter | d) None of the above |
- vi) Which of the following techniques is the most suitable for detecting a metabolite labelled with ^{13}C ?
- | | |
|---------------------------|----------------------|
| a) Infrared spectroscopy | c) NMR spectroscopy |
| b) Scintillation counting | d) Mass spectroscopy |
- vii) The wavelength of an absorption is 495 nm. In what part of the electromagnetic spectrum does this lie?
- | | |
|------------------------|--------------|
| a) Ultraviolet-visible | c) Microwave |
| b) infrared | d) radiowave |
- viii) In MALDI, the matrix is used, primarily to achieve
- | | |
|--------------------------------------|-------------------------|
| a) Extensive fragmentation of sample | c) Detection of ions |
| b) Soft ionization | d) Acceleration of ions |

[P.T.O.]

①

2. Attempt any any seven:

(7 x 2 = 14)

- i) Define: empty magnification
 - ii) What is meant by hydrodynamic focusing?
 - iii) What is meant by native gel electrophoresis?
 - iv) Write a brief note split injection system in gas chromatography.
 - v) Why quartz cuvette is used in UV sepectroscopy?
 - vi) Define molar absorptivity
 - vii) What is a photomultiplier tube?
 - viii) Define fluors?
 - ix) What are parent ions and fragment ions?
3. a) Briefly explain the functioning of atomic force microscope (06)
b) Explain the instrumentation of Phase contrast microscope (06)
OR
b) Explain agrose gel electrophoresis. (06)
- 4.a) Explain the detectors used in GLC. (06)
b) Describe the process of differential centrifugation. (06)
OR
b) Discuss the principle and applications of HPLC. (06)
5. a) What are the components of a monochromator system? Describe the working of a diffraction grating. How is it superior to prism? (06)
b) Outline the methods for sample preparation for IR spectroscopy. (06)
OR
b) Describe spin-spin coupling with a suitable example. What is the significance of this phenomnon in NMR spectroscopy? (06)
6. a) Enumerate the basic steps of mass spectroscopic analysis. Explain **any one** method of peptide sequencing by Mass spectroscopy. (06)
b) Write notes on a) Solid scintillation counting b) Geiger-Muller counter. (06)
OR
b) What are Biosensors? Explain the working of **any one** third generation biosensors in detail. (06)

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