REV-00
MBT/32/38

2017/12

M. Sc. BIOTECHNOLOGY
FIRST SEMESTER
BIOINSTRUMENTATION
MBT - 104

Duration: 3 Hrs. **Marks: 70**

Part : A (Objective) = 20
Part : B (Descriptive) = 50

[PART-B : Descriptive]

Duration: 2 Hrs. 40 Mins. **Marks: 50**

[Answer question no. One (1) & any four (4) from the rest]

1. Why pH is critical for the biological system? At what range the buffer works the best? Explain with any biological system buffer. 4+2+4=10

2. What are the different enzyme assay methods? Explain two such systems. 4+6=10

3. What are the different kinds of column systems used in HPLC? What are the differences between Gas Liquid Chromatography (GLC) Vs. High Performance Liquid Chromatography (HPLC)? 5+5=10

4. What is the basis for isoelectric focusing of proteins? What are the different assay methods for proteins and DNA? 2+8=10

5. Why there was a need for Capillary Gel Electrophoresis in research? Mention the different kinds of spectroscopy so far discovered. Critically explain one of them. 3+3+4=10

6. What is sedimentation? Explain its significance in separation technologies for isolation of particles from a suspension. 4+6=10

7. What are alpha, beta and gamma emission? Give a brief account of autoradiography with its theoretical basis. 4+6=10

8. What do you understand by 'biological application' of radioisotope techniques? Give an account of various methods and purpose of exploiting radioactivity in biological research/ study. 4+6=10

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[PART-A : Objective]

Choose the correct answer from the following : 1×10=10

1. What is the role of SDS in SDS-PAGE?
   a. Protein denaturing and imparting net genitive charge
   b. Imparting overall negative charge to the protein
   c. Imparting equal mass to all proteins
   d. Protein unfolding and imparting net positive charge

2. The electrophoresis technique that used isoelectric focusing is
   a. Agarose Gel Electrophoresis
   b. SDS-Polyacrylamide Gel Electrophoresis
   c. Pulse Field Gel Electrophoresis
   d. 2D-PAGE

3. The speed of migration of ions in an electric field depends on
   a. Magnitude of charge and mass of molecules
   b. Magnitude of charge and shape of molecules
   c. Shape and size of the molecules
   d. Magnitude of charge, shape, and mass of molecules

4. Chromatography is used to separate
   a. solution
   b. mixtures
   c. molecules
   d. atoms

5. Retention factor in chromatography describe
   a. The distribution of an analyte between the stationary and the mobile phase
   b. The migration rate of an analyte through a column
   c. The velocity of the mobile phase
   d. Both combination of cause a. & b.

6. Which of the following techniques would be most useful to identify and quantify the presence of a known impurity in a drug substance?
   a. IR
   b. HPLC
   c. NMR
   d. MS

7. In infrared spectroscopy which frequency range is known as the fingerprint region?
   a. 400-1400 cm^{-1}
   b. 1400-900 cm^{-1}
   c. 900-600 cm^{-1}
   d. 600-250 cm^{-1}

8. PH can be kept constant with help of
   a. Saturated solution
   b. Unsaturated solution
   c. Buffer solution
   d. Super saturated solution

9. Buffers present in blood contain
   a. HCO_3^-
   b. hemoglobin
   c. $H_2PO_4^-$
   d. All of them

10. The action of EDTA in EDTA-lysozyme treatment in bacterial DNA extraction is
    a. Removes Mg+ ions essential for maintenance of bacterial cell-wall structure
    b. Inhibits degradation of DNA by cellular enzymes
    c. Removes outer lipopolysaccharide layer of Gram negative bacteria
    d. All of these

B. *Answer True / False (√)* *1×10=10*

a. Centrifugation technology is based on the behavior of particles of different densities under application of centrifugal field. (true/false)

b. R. A. Fisher, a German scientist discovered radioactivity. (true/false)

c. All elements range from atomic number 83 and above is radioactive. **(true/ false)**

d. Very strong α emitters are used to sterilize food products, especially of animal origin i.e. milk and meat. (true/ false)

e. Atoine Henri Becquerel was honored with Nobel Prize in 1903. **(true/false)**

f. Wilhelm Roentgen was the discoverer of X-rays during 1885. (true/false)

g. Wilhelm Roentgen was the discoverer of X-rays during 1885. (true/false)

h. In scintillation counting technique the fluorescence emitted, which is very short, is expanded by primary and secondary fluor, PPO and POPOP respectively. **(true/false)**

i. In scintillation counting technique the fluorescence emitted, which is very short, is expanded by primary and secondary fluor, PPO and POPOP respectively. **(true/false)**

j. Radioisotopes can be utilized in the study of metabolic pathways in the biological sciences. **(true/false)**

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UNIVERSITY OF SCIENCE & TECHNOLOGY, MEGHALAYA

[PART (A) : OBJECTIVE]

Duration : 20 Minutes

Serial no. of the main Answer sheet

Course : .....

Semester : ..... **Roll No :** .....

Enrollment No : ..... **Course code :** .....

Course Title : .....

Session : 2017-18 **Date :** .....

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Instructions / Guidelines

- The paper contains twenty (20) / ten (10) questions.
- Students shall tick (✓) the correct answer.
- No marks shall be given for overwrite / erasing.
- Students have to submit the Objective Part (Part-A) to the invigilator just after completion of the allotted time from the starting of examination.

Full Marks	Marks Obtained
20	

Scrutinizer's Signature *Examiner's Signature* *Invigilator's Signature*