

**B.E. (Bio-Technology) Seventh Semester
BIO-714/704: Bio-Analytical Techniques**

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-r-x

- I. Answer the following:-
- In a spectrophotometer the range of absorbance can vary from _____ to _____.
 - What is sputtering
 - Name the two pumps that create vacuum in electron microscope.
 - Define Larmor frequency.
 - Name the two common types of detectors in Gas Chromatography.
 - What is the function of Goniometer?
 - FRET is an acronym for _____.
 - Why are electron microscopes not a good choice for biological samples?
 - In autoradiography the film is composed of _____ grains.
 - Draw the chemical structure of TMS. (10x1)

UNIT - I

- II. a) You have to separate a very complex mixture of volatile analytes. Name the technique that you will be using to achieve your goal. Discuss the different components of the instrument using a diagram.
- b) Discuss the derivation of Beer Lamberts law and draw a labeled diagram of double beam spectrophotometer. (2x5)
- III. a) J coupling is very common in ^1H NMR. Explain the reason for its occurrence, using $\text{CHCl}_2\text{CH}_2\text{Cl}$ as an example.
- b) Mention the differences between ^1H NMR and ^{13}C NMR. (6,4)
- IV. a) You are an environmental biologist and had to report about heavy metal pollution in a lake. Which analytical technique you will use to determine the metal ion concentration in the water, explain the working protocol in detail.
- b) Write a descriptive note on the principle of MRI. (2x5)

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UNIT - II

- V. a) Name the technique used for crystal structure determination and elaborate on what principle it works.
- b) Explain the working of Quadruple Analyzer in Mass Spectroscopy. How is it used to remove low mass and high mass ions? (2x5)
- VI. a) Give the advantages of using scintillation counter over Griger muller counter and mention any five application of radioisotopes in biological science.
- VII. b) A Griger muller counter has an efficiency of 95% and measures radioactivity as 999 dpm. Find out the actual decay in curie. (2x5)
- VIII. a) Name a microscope which does not have any lens. Describe its working principle using a diagram.
- b) You are provided with a mixture of isotopes which you have to separate, which analytical technique you will be using. Discuss the methodology in detail. (2x5)

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