Printed Page:-03 Subject Code:- BBT0401

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - THEORY EXAMINATION (2024- 2025)

Subject: Analytical Techniques

Time: 2 Hours Max. Marks: 50

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A 15

1. Attempt all parts:-

1-a. What is the minimum distance for the eye to focus any object? (CO1,K1) 1

(a) 11 cm

(b) 25 cm

(c) 32 cm

(d) 4 2 cm

1-b. Predict which of the following methods can be used to perform liquid chromatography? (CO2,K2) 1

(a) Only in columns

(b) Only on plane surfaces

(c) Either in columns or on plane surfaces

(d) Neither in columns nor on plane surfaces

1-c. Predict form the given options, the source of radiation in atomic absorption spectroscopy is typically:(CO3,K2) 1

(a) Laser

(b) Hollow cathode lamp

(c) Xenon lamp

(d) Filament

1-d. Which dye is commonly used to stain DNA in agarose gel electrophoresis? (CO4,K1) 1

(a) Bromocresol green
(b) Ethidium bromide
(c) Coomassie blue
(d) Crystal violet

1-e. Identify the volume range of Microcentrifuges that commonly used to process samples. (CO5,K3) 1

(a) 0.1–2 mL
(b) 10–50 mL
(c) 100–500 mL
(d) 500–1000 mL

2. Attempt all parts:-

2.a. What are the different types of lenses used in compound microscope. Give Brief description? (CO1,K1) 2

2.b. Explain how partition and adsorption chromatography differ in their separation mechanisms. (CO2,K2) 2

2.c. Explain electromagnetic radiation with Example. (CO3,K2) 2

2.d. Identify two factors that affect the migration rate of molecules in electrophoresis. (CO4,K3) 2

2.e. Illustrate how specificity affect the performance of a biosensor? (CO5,K3) 2

SECTION-B 15

3. Answer any three of the following:-

3-a. Which mode is much preferred in atomic force microscopy? And why explain. (CO1,K1) 5

3-b. Discuss the role of mobile and stationary phases in chromatography. (CO2,K2) 5

3.c. Explain the relationship between wavelength, frequency, and energy in the electromagnetic spectrum. (CO3,K2) 5

3.d. Illustrate the process of agarose gel electrophoresis for nucleic acid separation. Mention any two advantages of using agarose gel.(CO4,K3) 5

3.e. How are biosensors used to help keep people healthy and take care of the environment?(CO5,K3) 5

SECTION-C 20

4. Answer any one of the following:-

4-a. How does fluorescent microscopy provide an improvement over light microscopy? (CO1,K1) 4

4-b. What are the disadvantages of using a light microscope? (CO1,K1) 4

5. Answer any one of the following:-

5-a. Explain how the pH of the buffer affects separation in ion exchange chromatography.(CO2,K2) 4

5-b. List and briefly explain the major types of detectors used in Gas Liquid 4

Chromatography. (CO2,K2)

6. Answer any <u>one</u> of the following:-

6-a.	Discuss any two properties of electromagnetic radiation relevant to spectroscopy. (CO3,K2)	4
6-b.	Express two major applications of X-ray diffraction in biological sciences. (CO3,K2)	4

7. Answer any <u>one</u> of the following:-

7-a.	Illustrate the principle of electrophoresis and its importance in biotechnology. (CO4,K3)	4
7-b.	Compare the resolution ability of PFGE with conventional gel electrophoresis.(CO4,K2)	4

8. Answer any <u>one</u> of the following:-

8-a.	Illustrate the types and role of transducers in biosensors? (CO5,K3)	4
8-b.	Illustrate how biosensors help in medical diagnostics and environmental monitoring.(CO5,K3)	4

.