Reg. No. | | | | | | | | | | | | |

Question Paper Code : 51035

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Seventh Semester

Biomedical Engineering

OBT 751 — ANALYTICAL METHODS AND INSTRUMENTATION

(Common to : Electrical and Electronics Engineering/Electronics and Instrumentation Engineering/ Instrumentation and Control Engineering/ Medical Electronics)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are electromagnetic radiations?
2. Define the term signal to noise ratio.
3. List out the important applications of Fluorescence.
4. Define the terms absorbance and transmittance.
5. Write a note on the solvents used in NMR Spectroscopy.
6. List out the different types of ions formed in Mass Spectroscopy.
7. Explain the principle involved in HPLC.
8. List out the important applications of Ion exchange chromatography.

9. What are reference electrodes? Give examples.

10. Give the importance of electrochemical analysis in pharmaceutical analysis.

PART B — (5 × 13 = 65 marks)

11. (a) Write a note on the following in Spectrometry:

(i) Sources of radiations (8)

(ii) Sample containers (5)

Or

(b) List out and explain various sources of noises in spectrometry. Add a note on the process of enhancement of signal to noise ratio. (8+5)

12. (a) (i) Explain in detail the theory involved in Phosphorescence. (8)

(ii) Summarize on the factors affecting Phosphorescence. (5)

Or

(b) (i) Write a detailed note on the sample handling techniques in IR Spectroscopy. (10)

(ii) Discuss on the theory involved in IR Spectroscopy. (3)

13. (a) (i) Write a note on chemical shift. (3)

(ii) Summarize in detail the theory involved in NMR Spectroscopy. (10)

Or

(b) Illustrate the construction and working of Mass spectrometers and their parts with neat labeled diagram. (13)

14. (a) Summarize in detail the construction and working principle of Size exclusion chromatography. (13)

Or

(b) (i) Explain the advantages and disadvantages of Electrophoresis. (3)

(ii) Discuss the construction and working of Capillary electrophoresis in detail. (10)

15. (a) Elaborate the techniques of scanning probe microscopes in study of surfaces. (13)

Or

(b) (i) Illustrate the construction and working of a potentiometer with a neat labeled diagram. (10)

(ii) List out the important applications of voltammetry. (3)

PART C — (1 × 15 = 15 marks)

16. (a) State and derive Beer — Lamberts law. Discuss on the limitations and deviations of Beer — Lamberts law. (10 + 5)

Or

(b) Write a note on the following:

(i) Illustrate the construction and working of HPLC detectors. (8)

(ii) Summarize in detail the parameters in optimization of column performance. (7)