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

**Question Paper Code : 91018**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

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. List out various electromagnetic radiation employed in Spectrometry.
2. Write a short note on the important applications of various Spectrometric techniques.
3. Define Absorbance and Transmittance.
4. Define Quenching. List out different types of quenching.
5. List out the important applications of NMR Spectroscopy.
6. Write a note on the different types of ions formed in Mass Spectroscopy.
7. What do you mean by Normal phase and reverse phase mode?
8. Write a short note on the ion exchange resins used in Ion exchange chromatography.
9. List out the important applications of voltammetry.
10. List out the reference electrodes used in potentiometry. Add a note on its merits.

PART B — (5 × 13 = 65 marks)

11. (a) Write a note on the following.

(i) Properties of electromagnetic radiations. (5)

(ii) Sources of radiations. (5)

(iii) Sample containers. (3)

Or

(b) Write a detailed note on the following.

(i) Various sources of noise. (5)

(ii) Enhancement of signal to noise ratio. (5)

(iii) Signal process and read out devices. (3)

12. (a) (i) Theory of Fluorescence and Phosphorescence. (5)

(ii) Detectors of IR Spectroscopy. (8)

Or

(b) With a neat labelled diagram explain the construction and working of UV-Visible Spectrophotometer. (13)



13. (a) (i) Write a detailed note on the theory involved in NMR Spectroscopy. (6)

(ii) Define chemical shift. (2)

(iii) Write a note on construction and working of NMR Spectrometers. (5)

Or

(b) (i) Summarize in detail various ion sources. (10)

(ii) List out the important applications of 1H proton NMR. (3)

14. (a) (i) Brief a note on the conditions for optimization of column performance. (8)

(ii) Principle involved in Capillary electrophoresis. (5)

Or

(b) (i) Write a note on detectors used in HPLC. (8)

(ii) Brief a note on the Pumps used in HPLC. (5)

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15. (a) (i) Describe Instrumentation for potentiometric studies. (8)

(ii) Write a short note on cyclic and pulse voltametry. (5)

Or

(b) Summarize in detail the studies of surfaces. Add a note on its applications, merits and demerits. (8+5)

PART C — (1 × 15 = 15 marks)

16. (a) (i) Explain in detail the theory involved in Mass Spectrometry. (8)

(ii) Summarize in detail the construction and working of Mass Spectrophotometers. (7)

Or

(b) Explain the following in detail

(i) Principle and working procedure of Size exclusion chromatography. (10)

(ii) Principle and applications of GC (5)