Ex/PG/IEE/T/127A/2024

M.Tech. Instrumentation and Electronics Engineering, Examination 2024
(1st Year, 2nd Semester)

Instrumental Analysis

Time: Three Hours **Full Marks: 100**

[CO1]: Answer any two questions from Q1, Q2 and Q3

Q1. Discuss the theory of Raman spectroscopy. Give a block diagram of Raman spectrometer and identify the components. Write a note on the application of Raman spectrometry. 6+7+7

Q2. What is the principle of spectrophotometer? Explain a typical UV-visible spectrometer using double beam. 4+16

Q3. Write short notes of the followings: 2x10

a) NMR

b) Thermal conductivity detectors

[CO2]: Answer any one question from Q4 and Q5

Q4. a) Explain the following terms in connection with gas chromatography:

i) Chromatogram

ii) Retention time

b) Draw and explain the different parts of a gas chromatography. 4+16

Q5. Draw a block diagram showing components of a typical apparatus for HPLC. Describe the sample-injection systems and columns for HPLC. 8+6+6

[CO3]: Answer any two questions from Q6 and Q7 and Q8

Q6. a) Discuss the working principle of a voltammetry instrument.

b) Define the following terms:

i) Fourier transform voltammetry and ii) Square-wave voltammetry 14+6

Q7. a) Explain the basic principles involved in potentiometry.

b) With suitable diagram explain pH measurements using a glass electrode. 8+12

Q8. Write short notes of the followings: 2x10

a) Reference electrodes

b) Working electrodes for voltammetry instrument