Total No. of printed pages = 5

63/2 (SEM-3) CHM 302

2022

CHEMISTRY

(Theory Paper)

Paper Code : CHM-302

(Analytical Techniques)

Full Marks – 80

Pass Marks – 32

Time – Three hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct answers : 1×2=2

   (a) In gel permeation chromatography, which one is eluted first from the column ?

   (i) Cations

   (ii) Anions

   (iii) Bigger molecules

   (iv) Smaller molecules

[Turn over

(b) Which force is involved in the Chromatography ?

(i) Hydrogen bonding

(ii) London force

(iii) Electric static force

(iv) All of the above.

2. Answer the following questions :

(a) Name two chromatographic methods in which stationary phase is solid and mobile phase is liquid. 2

(b) What are the different steps involved in the chromatographic separation ? 2

(c) Write the four applications of Thin layer Chromatography. 2

(d) What are the different information obtained from GC – MS ? 2

(e) (i) Write the basic principles of Gas Chromatography. 5

Or

(ii) Draw a schematic diagram of HPLC instrument. 5

(f) Write the basic principles of Ion Exchange Chromatography. 5

(g) Write the different steps of experimental technique for Thin layer Chromatography. 10

3. Answer the following questions :

(a) (i) What type of chemical information can be obtained from XRD ? 2

(ii) What additional information over that obtained by thermogravimetry may be obtained by using DSC ? 3

(b) Give a brief description of principle, instrumentation and application of X-ray emission spectroscopy. 5

Or

Give a brief description of principle, instrumentation and application of X-ray fluorescence spectroscopy. 5

(c) Explain Anode-stripping voltammetry with examples. 5

Or

Write short notes on : 2½×2=5

(i) Electrogravimetry

(ii) Spectroelectrochemistry.

(d) Describe the basic principles and instrumentation involved in TGA. What type of information is obtained by the application of this technique ? 4+3+3=10

Or

Discuss the theory and instrumentation of X-ray diffraction study. Explain the phase problem. 3+4+3=10

4. Answer the following questions :

(a) What is FESEM ? How does a FESEM function ? 5

Or

Write the principle and instrumentation of SEM. 5

(b) Write short notes on any *one* : 5×1=5

(i) Selected area diffraction pattern

(ii) Convergent area diffraction pattern.

(c) Explain the general principles of atomic force microscopy. 5

Or

Briefly explain the operational modes of atomic force microscopy. 5

5. Answer the following questions :

(a) How air (dust) and water samples are prepared for analysis ? 4

(b) Explain how does ICP-MS work. 4

Or

Write the basic principles of atomic absorption spectroscopy.

(c) Explain any one method of microwave digestion of a sample in metal analysis. 2