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

Question Paper Code: 2035031

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024
Fifth Semester
Chemical Engineering
U20CH501 – INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS
(Regulation 2020)

Time: Three Hours | Maximum: 100 Marks

Answer ALL Questions

PART – A (10 x 2 = 20 Marks)

1. Mention any four parameters or properties of electromagnetic radiation.

2. Compare between hypsochromic shift and bathochromic shift in UV spectroscopy.

3. Indicate whether following vibrations will be active or inactive in IR region.

Molecule	Motion
(a) CH_3-CH_3	C-C Stretching
(b) SO_2	Symmetric stretching

4. State two significant applications of mass spectroscopy in pharmaceutical analysis.

5. Define R_f value in thin layer chromatography.

6. Indicate any two carrier gases that are used in GC.

7. Spell out the limitations of T.G.A.

8. Provide the advantages of DTA over TGA.

9. Identify any four factors influence the choice of precipitants in gravimetric analysis.

10. Differentiate between nucleation and coagulation in precipitation highlighting their significance in gravimetric analysis.

PART – B (5 x 16 = 80 Marks)

11. (a) Illustrate the working principle, components, advantages and applications of double beam spectrophotometer. (16)

(OR)

(b) Explain the principles, instrumentation and applications of NMR spectroscopy.(16)

12. (a) (i) Calculate the vibrational absorption frequency of the carbonyl, > C = O group if force constant of the double bond is 1.0×10^6 dyne/cm^2. (8)

(ii) Describe various modes of vibrations of polyatomic molecule in IR spectroscopy. (8)

(OR)

(b) (i) Describe the principle and applications of mass spectroscopy. (8)

(ii) Show the McLafferty rearrangement, providing an example of its occurrence in mass spectroscopy. (8)

13. (a) With a suitable sketch, explain the principle and working of column chromatography. Also list its advantages and limitations. (16)

(OR)

(b) Elaborate the principle, instrumentation and applications of the Isotopic Dilution Method in quantitative analysis, highlighting its advantages and limitations. (16)

14. (a) Elucidate the principle, instrumentation and applications of TGA and DTA. (16)

(OR)

(b) Discuss in detail about the principle, instrumentation and applications of polarography in analysis process. Mention its advantages and limitations. (16)

15. (a) Enumerate the principle and steps involved in gravimetric analysis. (16)

(OR)

(b) Distinguish between co-precipitation and post – precipitation. How these can be minimized? Also explain the principle involved, chemical reactions, procedure and calculations for gravimetric estimation of barium as $BaSO_4$. (16)

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