U.G. 5th Semester Examination - 2021

CHEMISTRY

[HONOURS]

Discipline Specific Elective (DSE)
Course Code : CHEM-H-DSE-T-2B

Full Marks : 40   Time : $2\frac{1}{2}$ Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer any **five** questions: 2×5=10

   a) Define R_f value in chromatography.

   b) What is NMR spectroscopy?

   c) Why is atomic fluorescence more sensitive than atomic absorption?

   d) Write the advantages of FTIR.

   e) Differentiate between emission spectroscopy and absorption spectroscopy.

   f) Why is instrumental analysis important?

   g) What is shielding in NMR?

   h) Arrange the following electromagnetic radiation in the increasing order of their energy:

   Radio frequency, UV, Microwave and IR.

2. Answer any **two** questions :   5×2=10

   a) i) What is column chromotography? In which purpose it is used?

   ii) What type of solvents are usually used in chromatography?   3+2

   b) Write short notes on : $2\frac{1}{2}+2\frac{1}{2}$

   i) Fluorescence spectroscopy

   ii) Absorption spectroscopy

   c) What are the steps involved in an X-ray diffraction instruments?   5

   d) i) Write the advantages of double beam instrument.

   ii) Explain, why absorption peaks obtained in UV-spectra are broader than those obtained in IR spectra?   3+2

3. Answer any **two** questions :   10×2=20

   a) i) In connection with column chromatography explain the term : adsorption, developers and solvents.

   ii) What are the advantages of potentiometric titration?

   iii) What is the principle of Voltameter?   5+3+2

b) i) In what respect chromatography is superior to other separation techniques?

ii) Define coupling constant.

iii) Write the names of four commonly used NMR solvent.

iv) Describe the principles of ion chromatography. 2+2+2+4

c) i) What is meant by the term 'Chemical shift'?

ii) Describe the principle of TLC. R_f values of three compounds A, B and C are 0.15, 0.38, 0.68 respectively. Which one of these compounds in their TLC separation will occur on the top, which one at bottom?

iii) Discuss neutron activation analysis with its limitation. 2+(2+3)+3

d) i) Deduce Brag's equation and discuss its use in X-ray spectroscopy.

ii) How will you proceed to determine molecular formula of an organic compound using mass spectrometer?

iii) Why is the formation of unipositive ion considered to be the most significant feature of mass spectral studies?

iv) What is meant by dual nature of light? 3+3+2+2

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