B.Sc. 6th Semester (Honours) Examination, 2021

CHEMISTRY

(Analytical Methods in Chemistry)

Paper : UG/CHEM/603/DSE-3
Course ID.: 61416

Time: 1 Hour 15 Minutes   **Full Marks: 25**

The figures in the margin indicate full marks.

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

1. Answer *any five* questions.   5×1=5

   (a) Define "mole ratio method" for quantitative analysis.

   (b) What is chromatogram?

   (c) What do you mean by confidence interval?

   (d) Give any four sources of IR radiation.

   (e) Mention the difference between the end point and the equivalence point in a titration.

   (f) What do you understand by column efficiency in chromatography?

   (g) What are the moving and stationary phases in paper chromatography?

   (h) Write the full form of RAM and ROM.

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

   (a) Which selection rule is used for IR spectroscopy? Write down the limitation(s) of infrared
   (IR) spectroscopy. Why KBr is used in IR?   2+2+1=5

   (b) (i) Write the role and concentration of HCl in the extraction of Fe^{3+} in ether.

   (ii) Cu^{2+} is extracted from 25 mL aqueous solution to 10 mL organic solvent. Calculate the
   distribution ratio, considering 99.8% extraction.   2+3=5

   (c) What do you mean adsorption chromatography and partition chromatography? Describe
   the comparison of HPLC, GLC and GC.   2+3=5

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(d) (i) Regarding flame emission spectrometry, what will be the choice of flame, monochromator and detector?

(ii) What information do you get from the retardation factor (R_f) value?   3+2=5

3. Answer *any one* question.   1×10=10

(a) (i) The following values were obtained for the determination of cadmium in a sample of dust: 4.3, 4.1, 4.0, 3.2 µg g^{-1}. Should the value of 3.2 be rejected? (Given Critical value of Q for a sample size of 4 is 0.831).

(ii) Name the different types of thermoanalytical technique. Write the factors which affect thermogravimetric analysis.

(iii) What is "Q-test" in aspect of analytical analysis?

(iv) Differentiate between accuracy and precision.   4+2+2+2=10

(b) (i) Explain briefly the working of a pH meter.

(ii) What are the conditions under which Lambert Beer's Law is not valid?

(iii) 12g of butyric acid was dissolved in 300ml of water and was extracted with benzene. In one experiment 300ml of benzene was used for a single extraction and in another three 100ml portions were used for extraction. Find the amount of butyric acid extracted by the two methods and comment which one was more efficient. (Given that the distribution coefficient of butyric acid between benzene and water is 3).   3+2+5=10

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