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MCH-003

POST GRADUATE DIPLOMA IN ANALYTICAL CHEMISTRY (PGDAC)

Term-End Examination

June, 2021

MCH-003 : SPECTROSCOPIC METHODS

Time : 3 Hours *Maximum Marks : 75*

Note : *(i) Answer any* ***five*** *questions out of the eight given.*

(ii) All questions carry equal marks.

1. (a) State Beer-Lambert's law. Write the factors responsible for the deviation of the law. 5

   (b) Draw a neat sketch of double beam spectrophotometer and explain the function of each component. 5

   (c) List various types of sources employed in IR spectrophotometry and explain any *one* in brief. 5

2. (a) How is FTIR different from IR ? Write any *two* advantages of FTIR spectrometer. 5

   (b) The mortar absorptivity of a substance is 2.0×10^4 cm^{-1} mol^{-1} dm^3. Calculate the transmittance through a cuvette of path length 5 cm containing 2.0×10^{-6} mol dm^{-3} solution of the substance. 5

   (c) Draw a schematic representation of the experimental setup of a Raman spectrometer and briefly explain the functions of its components. 5

3. (a) Describe in brief fluorescence quenching and write the Stern-Volmer equation. Which type of atoms/molecules show quenching ? 5

(b) Describe the analysis of amino acids and proteins by fluorimetry. 5

(c) Discuss the factors affecting qualitative analysis by fluorimetry. 5

4. (a) State the principle of flame photometry. Write the important reactions occurring in the flame. 5

(b) Describe the construction of a premix burner with a diagram. 5

(c) Explain internal standard method used in flame photometric determination. 5

5. (a) Draw a neat diagram of Hollow Cathode Lamp (HCL) and explain its working. 5

(b) Describe applications of AFS briefly. 5

(c) Name any *five* types of atomic fluorescence transitions. 5

6. (a) Write a short note on atomisers used in AAS. 5

(b) Write *three* advantages and *two* disadvantages of GFAAS. 5

(c) Describe in brief interferences observed in AAS. 5

7. (a) Write any *five* characteristics of an ideal atomization-excitation source used in ICP-AES. 5

(b) Explain, how qualitative analysis is carried out using ICP-AES. Also state its importance. 5

(c) Describe the salient features of AAS. 5

8. (a) Write the structure of TMS. Why is it used as a reference for chemical shifts in NMR ? 5

(b) Discuss NMR spectrum of C_2H_5OH in low and high resolution. 5

(c) Explain chemical ionization method to produce ions in mass spectrometer taking $C_2H_5NH_2$ as an example. 5

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