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MCH-003

00280

P.G. DIPLOMA IN ANALYTICAL CHEMISTRY (PGDAC)

Term-End Examination

December, 2012

MCH-003 : SPECTROSCOPIC METHODS

Time : 3 hours *Maximum Marks : 75*

Note : *Answer **any five** questions in all. Question number **1** is compulsory.*

1. Answer ***any five*** of the following : **5x3=15**

(a) Define -

(i) Nebulizer

(ii) Monochromator

(iii) Line spectrum

(b) What are the advantages of GFAAS ?

(c) What is the role of organic solvent in atomization ?

(d) Define sensitized fluorescence. Discuss its significance.

(e) State Beer-Lambert' law. List the deviations observed from this law.

(f) Explain the basic principle of mass spectrometry and list different types of peaks obtained in mass spectra.

2. (a) Explain - degree of depolarization in Raman spectrum. What is its significance ? 4

(b) What kind of assembly is required for room temperature phosphorescence (RTP) measurement ? Explain with a suitable diagram. 6

(c) Describe various types of reactions producing fluorescence. 5

3. (a) What types of interferences are possible in flame photometric analysis ? 5

(b) Describe different mechanisms of non-radiative relaxation of an excited electronic state. 5

(c) Describe the role of H_2O_2 in analysis of glucose in fluorimetry ? 5

4. (a) Differentiate between internal conversion and intersystem crossing. 4

(b) What is chemiluminescence ? Explain how it is useful in the determination of NO - NO_2 in polluted air. 5

(c) Give reasons - 6

(i) AFS has not been accepted widely as analytical technique.

(ii) Use of total consumption burner is exceptional.

5. (a) Explain why a sharp line source is required in atomic absorption spectrophotometry ? 5

(b) Describe standard addition method of analysis for flame photometric measurements. 5

(c) Ar is the best choice for all types of plasma sources. Justify. 5

6. (a) What are the slew scan instruments ? State the importance. 5

(b) Describe applications of inductively coupled plasma atomic emission spectrometry. (ICPAES). 5

(c) Draw a neat diagram of ICP torch and explain the working of various components involved in it. 5

7. (a) What are the advantages of using a magnet with higher field strength in NMR spectroscopy ? 4

(b) Draw a schematic diagram of a double focussing mass spectrometer and explain its working. 6

(c) How will you distinguish between ethanol (C_2H_5OH) and dimethyl ether (CH_3OCH_3) on the basis of NMR spectra. 5

8. (a) Discuss the importance of molecular formula and Index of Hydrogen Deficiency (IHD) in the structure elucidation of an organic compound. 5

(b) Calculate IHD in the following cases - 3

(i) $C_{10}H_{22}$

(ii) C_7H_8

(iii) $C_4H_{11}N$

(c) A compound having formula C_3H_6O showed following spectral data -IR-strong absorption at 1700 cm^{-1} 7

NMR - $\delta = 2.2$, single signal

Mass - peak at m/z = 15, 43, 58, M^+, = 58
Base peak = 43

Determine the structure of the molecule and assign the signals.