

**UNIVERSITY OF JAFFNA, SRI LANKA**  
**BACHELOR OF PHARMACY**  
**FOURTH YEAR FIRST SEMESTER EXAMINATION – JANUARY 2016**  
**PHAPA 4101 PHARMACEUTICAL ANALYSIS**  
**PAPER II**

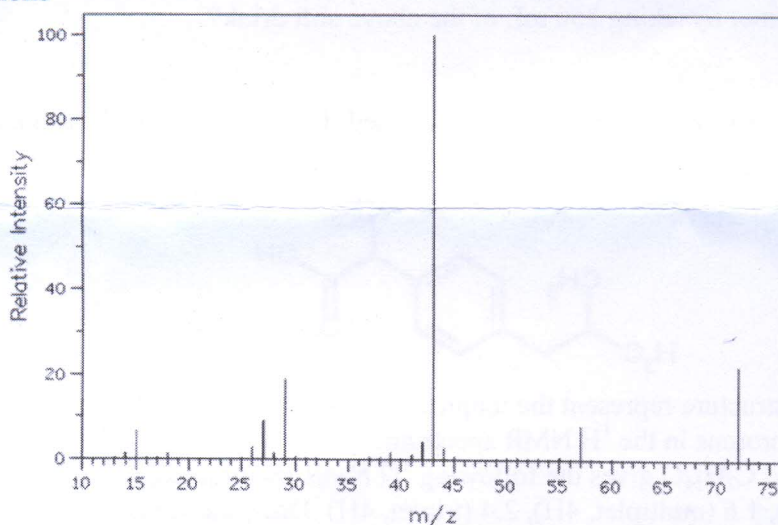


**Date: 18/01/2016**

**Time: 02 Hours**

**Answer all six questions**

1. 1.1 Explain the advantages and limitations of the Gas Chromatography (GC)? (30 Marks)
- 1.2 Draw a schematic diagram to illustrate the
  - 1.2.1 Flame Ionization Detector (FID) and (25 Marks)
  - 1.2.2 Electron Capture Detector (RID). (25 Marks)
- 1.3 List five parameters that can reduce the column efficiency in GC. (20 Marks)
  
2. 2.1 Give the basic principle of mass spectrometry. (20 Marks)
- 2.2 Draw the structure of the molecular ion and the fragmentation patterns of primary and secondary alcohols. (30 Marks)
- 2.3 Using the mass spectrum of 2-butanone shown below, answer the following questions



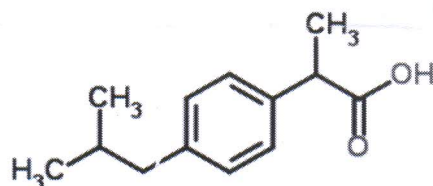
- 2.3.1 Draw the structure of molecular ion and provide its m/z value for the above spectrum. (20 Marks)
  - 2.3.2 Draw the fragmentation mechanism for peaks at 43 and 57. (30 Marks)
  
  3. 3.1 Give the principle of Infra-Red (IR) spectroscopy (20 Marks)
  - 3.2 What are advantages and disadvantages of the IR spectroscopy? (30 Marks)
  - 3.3 Predict the approximate positions of all the important absorptions in the IR spectrum of the following compound. (30 Marks)
- $$\text{CH}_3\text{CH}_2\text{CH}=\overset{\text{O}}{\parallel}\text{COOH}$$
- 3.4 Treatment of benzaldehyde ( $\text{C}_6\text{H}_5\text{CHO}$ ) with  $\text{Zn}(\text{Hg})$  in aqueous  $\text{HCl}$  gives a product "Z" that has a molecular ion at  $m/z = 92$  and IR absorbance at  $3150\text{-}2950$ ,  $1605$ , and  $1496\text{cm}^{-1}$ . Draw the structure of Z. (20 Marks)

- 4 4.1 Draw a schematic diagram to illustrate the electron transition that occurs in the atomic emission spectroscopy (AES). (20 Marks)
- 4.2 Explain the interferences in Atomic Absorption Spectroscopy analysis? (30 Marks)
- 4.3 In an experimental method to estimate the concentration of iron absorbance value in a liquid preparation, 5.0 mL sample was diluted to 50.0 mL. The absorbance of the diluted solution and standard solutions were measured using Atomic Absorption Spectroscopy. The results are given in the following table.

Concentration of Solutions (ppm)	Absorbance (nm)
0.00	0.010
1.00	0.080
2.00	0.150
3.00	0.220
4.00	0.290
Sample	0.190

- 4.3.1 Plot a graph between the concentrations against absorbance value of the standard iron solutions. (20 Marks)
- 4.3.2 Calculate the concentration of iron, in ppm, in the undiluted soft drink. (15 Marks)
- 4.3.3 The recommended daily allowance (RDA) of iron for an adult female is 18 mg. What percentage of the daily requirement can be met by taking 250 mL of the above soft drink? (15 Marks)
- 5 5.1 How the structural information are obtained from  $^1\text{H}$  Nuclear Magnetic Resonance (NMR)? (20 Marks)

5.2



- The above structure represent the ibuprofen. Predict the  $^1\text{H}$  NMR spectrum and assign protons in the  $^1\text{H}$  NMR spectrum. (40 Marks)
- 5.3 A compound  $\text{C}_7\text{H}_{14}\text{O}$  gives the following  $^1\text{H}$  NMR spectral data: 0.9 (triplet, 6H), 1.6 (multiplet, 4H), 2.4 (triplet, 4H). Draw the structure of the compound? (20 Marks)
- 5.4 Explain the reason for observing a doublet in  $\text{BrCH}_2\text{CHBr}_2$  molecule. (20 Marks)

- 6 6.1 Define "Quality Control" (20 Marks)
- 6.2 List the factors that determine the drug quality. (40 Marks)
- 6.3 Explain the basic requirements of quality control of drugs. (40 Marks)