

**UNIVERSITY OF JAFFNA**  
**BACHELOR OF PHARMACY**  
**FOURTH YEAR FIRST SEMESTER EXAMINATION – JULY 2013**  
**PHABT4104- PHARMACEUTICAL ANALYSIS AND NUCLEAR PHARMACY**

Date: 15.08.2013

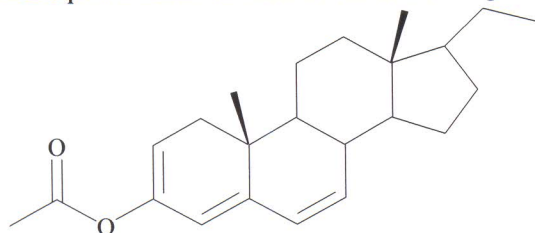
Time: 03 Hours

ANSWER ALL THE SIX QUESTIONS

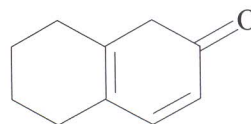
Answer Part A and part B in a separate answer Book

Part A

1. 1.1 Briefly describe the method of **gas chromatography-mass spectroscopy** used in quality control of pharmaceuticals. Your answer should include the **uses of gas chromatography-mass spectroscopy, instrumentation, ionization and analysis.** (40 Marks)
- 1.2 What is packaging in pharmaceuticals? Describe the **role** of packaging material on pharmaceutical product stability. (30 Marks)
- 1.3 List the important informations carried by a **label** of a finished drug product. (30 Marks)
  
2. Discuss the principles and applications of Ion-exchange chromatography and paper chromatography. (100 Marks)
  
3. 3.1 3.1.1 Briefly explain the principle of Flame Photometry.  
 3.1.2 Discuss the interferences in Flame Photometry.  
 3.2 The UV spectrum at compound **X** ( $C_9H_{10}O$ ) showed bands at 252 and 280 nm. The IR spectrum of **X** had bands at 3030, 2985, 1718, 737 and 695  $cm^{-1}$ . The  $^1H$  NMR spectrum of **X** had signals at  $\delta$  7.20 (S, 5H), 2.78 (S, 2H), and 2.15 (S, 3H). The mass spectrum of **X** had peaks at  $m/z = 134, 119, 91,$  and 43. Deduce the structure of compound **X**. (50 Marks)
  
4. 4.1 4.1.1 Describe the principle of Fluorescence Spectrometer.  
 4.1.2 Write down the relationship between concentration and Fluorescence Intensity, and under what conditions Fluorescence Intensity is proportional to concentration? (40 Marks)
- 4.2 The absorbance of a solution containing 39.2 mg of cyclohexane ( $C_6H_{10}O$ ) in 10.0 ml of hexane when measured in a 1.0 cm cell was found to be 0.75 at 288 nm. Calculate the molar absorption co-efficient of cyclohexane at 288 nm. (35 Marks)
- 4.3 Using the Woodward-Fieser-Scott rule, calculate the  $\lambda_{max}$  value of the UV absorption band of each of the following compounds (**A** and **B**). (25 Marks)



A



B

**Part B**

5. 5.1. Tele cobalt-60 and medical linear accelerator are playing important role to treat the cancer patients via external beam radiotherapy. State the differences between them on the following.
- 5.1.1. Radiation source (10 Marks)
  - 5.1.2. Radiation type (10 Marks)
  - 5.1.3. Radiation safety (10 Marks)
  - 5.1.4. Treatment facility (10 Marks)
- 5.2. Briefly describe the importance of the linear attenuation co-efficient in different types of interaction of radiation with matter. (30 Marks)
- 5.3. Compare stochastic effect and deterministic-effect in radiation protection. (30 Marks)
6. 6.1. Gamma camera plays an important role to take images in nuclear medicine. Briefly describe the functions of the following components of the Gamma camera.
- 6.1.1. Collimators (05 Marks)
  - 6.1.2. Scintillation material (05 Marks)
  - 6.1.3. Optical coupling material (05 Marks)
  - 6.1.4. Dynodes (05 Marks)
  - 6.1.5. External electrical circuits (05 Marks)
- 6.2. Give four examples for generator produced radionuclides used in nuclear medicine imaging. (20 Marks)
- 6.3. Give three principle methods to minimize the radiation exposure. (15 Marks)
- 6.4. Calculate the required thickness to reduce the photon radiation beam intensity from 100 % to 15 %.  
(The half value layer of a monochromatic beam in a material is 4.6 cm.) (40 Marks)