Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.PHARM.-SEMESTER–VII- EXAMINATION –SUMMER-2017

Subject code: 270004 Date: 05/05/2017

Subject Name: Pharmaceutical Analysis III

Time: 02:30 PM to 05:30 PM Total Marks: 80

Instructions:

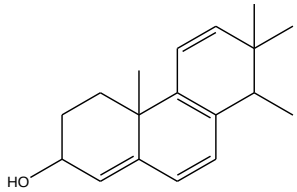
1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 (a) Explain Beer Lambert's law. Derive its equation and state its limitations. **06**

(b) Discuss structural features that may produce bathochromic or hypsochromic shift in UV spectrum of an organic compound. **05**

(c) Calculate following. **05**

1. One liter solution is prepared by dissolving 0.1235 g of substance A (Mol. weight = 214.3 g/mole) in sufficient methanol. The absorbance of resulting solution at 235 nm is found to be 0.824 in 1 cm cell. Calculate the molar absorptivity of substance A.
2. Predict the absorption maximum of the following compound from the structure using Woodward-Feiser law.



Q.2 (a) Explain the terms with reference to EMR: Diffraction, Reflection and Refraction. **06**

(b) Discuss the working of hollow-cathode lamp with labeled diagram. **05**

(c) Twenty paracetamol tablets having average weight 0.65 g are finely powdered. Accurately weighed 0.13 g of tablet powder is sonicated with 25 mL 0.1 M sodium hydroxide solution, diluted up to 100 mL with distilled water and filtered. To 1 mL of filtrate, 10 mL of 0.1M sodium hydroxide is added and diluted to 100 mL with distilled water. Absorbance of resulting solution measured on UV-Visible spectrophotometer at 257 nm wavelength using 1 cm quartz cell is found to be 0.644. Calculate the content of paracetamol in sample tablets (in terms of % of labeled claim) taking 715 as the specific absorbance at 257 nm. Labeled claim of tablets is 500 mg of paracetamol. **05**

Q.3 (a) Explain design and working of ICP torch. Describe the methods of introducing samples in ICP torch. **06**

(b) Explain the theory of fluorescence and phosphorescence with reference to the Jablonski diagram. **05**

(c) Quinine in 1.664 g antimalarial tablet was dissolved in sufficient 0.1M HCl to give 500 mL of solution. A 20.00 mL aliquot was then diluted to 100.0 mL with the acid. The fluorescence intensity of this test sample at 347.5 nm provided a reading of 245 on an arbitrary scale. A standard 100 ppm quinine solution

registered 125 when measured under conditions identical to those for test sample. Calculate the mass in mg of quinine in the tablet. **05**

Q.4 (a) Discuss the factors affecting IR absorption frequencies. **06**

(b) Define and classify fundamental molecular vibrations with examples. **05**

(c) Attempt following. **05**

1. Explain the statement: IR absorption due to carbonyl stretching occurs at higher frequencies than stretching of carbon-carbon double bond.
2. How will you differentiate between acetone, acetic acid and dimethyl ether using IR spectroscopy?

Q.5 (a) Explain general fragmentation rules applicable to electron impact source in mass spectrometry. **06**

(b) Explain the working of following mass analyzers

1. Quadrupole **05**
2. Time of flight

(c) Write a short note on **05**

1. Mc-Lafferty rearrangements
2. MALDI

Q. 6 (a) Explain the term 'chemical shift'. Discuss the factors affecting chemical shift with suitable examples. **06**

(b) Write a brief note on C^{13} NMR spectroscopy. **05**

(c) Predict number of signals and splitting pattern in H^1 NMR spectrum of isopropyl chloride and p-methoxy toluene. **05**

Q. 7 (a) Define the terms: Bathochromic shift, Stokes shift, Atomization, Mass to charge ratio, Fermi resonance, Quenching **06**

(b) Calculate following. **05**

1. Calculate the frequency in hertz and the energy in joules/photon of an EMR with a wavelength of 530 nm.
   (plank constant $h = 6.63 \times 10^{-34}$ J.s)
2. Convert the following absorbances in to % transmittance.
   a. 0.278
   b. 0.039
   c. 1.499

(c) Suggest a structure for an organic compound having molecular formula $C_8H_{11}N$ that shows the following spectral data. **05**

IR: sharp band at 3400 cm^{-1}, absorption near 3100 cm^{-1} and 2950 cm^{-1}, bands around 1400, 1500 and 1600 cm^{-1} and two strong bands around 700 and 750 cm^{-1}.
NMR: a five proton multiplet at δ 6.5-7.5, a triplet-quartet pattern at δ 1.2 and δ 3.1 respectively, a sharp singlet (1H) at δ 3.3
MS: A molecular ion peak at m/z 121 and a base peak at m/z 106.

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