BITS PILANI, DUBAI CAMPUS
SECOND SEMESTER 2013-2014
COMPREHENSIVE EXAM

Course Title: Instrumental Methods of Analysis	**Course No.: BIOT F244**
Maximum Marks: 40	**Weightage: 20%**
Time: 2 hours	**Date: 29th May 2014**

1a. Explain the wet digestion method of sample preparation for ICP analysis. Why is it specially applied for analyzing arsenic from soil samples? [2+1]
b. What are the different factors that decide the molecular fluorescence of a compound? Explain with an example of each factor. [3]
c. Explain the working of an interferometer in a FTIR. [4]

Q2a. What are Theoretical Plates? How can we determine the efficiency of a column on the basis of Theoretical Plates? [2]
b. Give the major disadvantages of an autoanalyzer that limits its use otherwise. Also, mention any two applications of the autoanalyzer in clinical diagnosis of pathogens. [3]
c. Explain how you will separate a mixture of high molecular weight polymers using column chromatography. (Name the mode or type of chromatography, stationary phase and mobile phase you would use.) [1.5]
d. How would you differentiate a ketone, an ester and an acid on the basis of IR spectroscopy? [1.5]
e. A pure sample of d-borneol is found to produce an optical rotation of 10.1. Calculate the concentration of d-borneol if the specific rotation is 37.7 ml/g dm [2]

Q3a. Differentiate between AAS and ICP-OES [3]
b. Justify, the temperature program ina gas chromatography technique is the most important for good separation of compounds from a mixture. [3]
c. State the principle of a gel electrophoresis technique? What are the different types of electrophoretic techniques? Mention their applications. [4]

Q4a. Why is it important to check the Raman spectrum before performing any fluorescence analysis? [3]
b. What are the different types of columns used for gas chromatography? List their advantages and disadvantages. [3]
c.What are input transducers? Give two examples of these used in Gas chromatography. [2]
d. Justify, Molecular spectra are more complex than atomic spectra. [2]

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BITS PILANI DUBAI CAMPUS
DUBAI INTERNATIONAL ACADEMIC CITY
SECOND SEMESTER 2013-2014
Test 1 (OPEN BOOK)

Course NO: BIOT F244 **Maximum Marks: 20**
CourseTitle: INSTRU METHODS OF ANAL **Weightage: 10%**
Date: 7.04.2014

Answer all the questions in the given sequence

1. Differentiate between Turbidimetry and visible spectroscopy. [2]

2. The absorbance of an iron thiocyanate solution containing 0.00500 mg Fe/mL was reported as 0.4900 at 540 nm.
[a] Calculate the specific absorptivity, including units, of iron thyocyanate on the assumption that a 1.00 cm cuvette was used. [1]
[b] What will be the absorbance if (i) the solution is diluted to twice its original volume and (ii) the solution is placed in a 5.00 cm cuvette? [1]
[c] What percent of light is transmitted by the original iron thiocyanate solution? [1]
[d] What concentration of iron thiocyanate will absorb 50% of the entering light? [2]

3. Why does Beer Lambert's law exhibit a deviation at higher concentrations of the absorption medium.? [3]

4. What are interferences in atomic absorption measurements? Explain the different types. [3]

5. What is the role of the flame in an Atomic absorption spectroscopy? Can we replace the flame by any other component in the AAS? [2]

6. Justify, Fluorescence spectrophotometers make use of two monochromators and have the detectors placed at right angles to the incident light. [3]

7. A student was working on flourescein solution. He accidentally placed the sample in the oven at 80C instead of keeping at the room temperature incubator. What do you think would happen to the sample? Justify your answer. [2]

**********ALL THE BEST**********

BITS PILANI, DUBAI CAMPUS

SECOND SEMESTER 2013-2014

QUIZ – 2

BIOT F244: INSTRUMENTAL METHODS OF ANALYSIS

Date: 5.05.14(M5) **Time 20 minutes** **Max Marks: 10** (Weightage 10%)

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1. What do you mean by Fourier Transform? [2]

2. What is reverse phase HPLC? Give an example of a reverse phase column. [2]

3. Briefly explain why a C=O bond stretch occurs at 1750 cm-1 and a C–O stretch occurs at 1100 cm-1. [2]

4. In an IR spectra, give the wavenumbers for the following functional groups [2]

Functional groups	Wavenumber
N=O	
C-C	

5. What is the efficiency factor (N) in a HPLC? [2]

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BITS PILANI, DUBAI CAMPUS

SECOND SEMESTER 2013-2014

Quiz – 1 (Closed Book)

BIOT F244: INSTRUMENTAL METHODS OF ANALYSIS

Date: 17.03.14 (M5) **Time 20 minutes** **Max Marks: 10** (Weightage 10%)

1. Give examples of any three electrochemical techniques. [1.5]

2. What are Signal generators? Mention the methods of using these generators. [3]

3. The energy associated with the EMR is **3.6×10^{-9} eVs.** Find the wavelength of the light. [2]

4. What is the use of output transducers in an instrument? Give examples of any two output transducers. [2]

5. What are molecular vibrations? In which region of the EMR are these observed? [1.5]