**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI**

**COMPREHENSIVE EXAMINATION: II SEMESTER: 2015-16**

**INSTRUMENTAL METHODS OF ANALYSIS: BIO F244**

**CLOSED BOOK**

**Max marks: 30**

**Max Time: 120 min Date: 9/5/16**

**Note: Answer Part A and Part B in separate answer sheets.**

**PART A**

Q1. Fill in the blanks with a suitable option (5)

1. The unit of Planks constant is \_\_\_\_\_\_\_\_.
2. Quantitative analysis by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ method is carried out by filling colored

solutions/samples and visually comparing their intensity.

1. Polarizers are made of \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_ for Visible and UV light respectively**.**
2. \_\_\_\_\_\_\_\_\_\_ is a highly sensitive technique to study the thermotropic properties of

many different biological macromolecules and extracts.

Q2. Arrange the energy levels of molecular orbitals in the decreasing order of magnitude. (1)

Q3. Can Beer Lamberts law be used to determine purity of a given substance? If so, How? (2)

Q4. What are the differences between the UV- Vis and fllourescence spectrometer in terms of the following?

1. Sample holder
2. Electronic transitions in excited sample
3. Arrangement of components
4. Intensity measurement

(2)

Q5. What is the difference between the detector on IR spectrometer and that of UV Vis spectrometer. Why do the detectors need to be different? (2)

Q6. Draw a schematic diagram of flame emission spectrometer. (1)

Q7. What are the various types of vibrations in polyatomic molecules irradiated by IR light.

(2)

**PTO**

**PART B**

**Note:** To be answered in separate answer in separate answer sheet.

Q1. Enumerate the comparative advantage(s) and disadvantage(s) of the following: [2+2]

(i) 50 mm vs 100 mm long HPLC columns (same stationary phase particle size)

(ii) 1.7 micron vs 5 micron stationary phase particle size (same column length)

Q2. Suppose in a HPLC chromatogram, you do not get the expected single peak, rather observe multiple peaks at different Rt values. In such a case, how will you go about the MS analysis for compound identification? Justify your answer briefly. [2]

Q3. Enlist the different aims which derivatization of compounds (prior to GC analysis) helps to achieve. [2]

Q4. Briefly explain the process from start to end how you go about estimating the native and subunit molecular masses of proteins using: [2+2]

(i) PAGE

(ii) Size exclusion chromatography

Q5. Briefly explain the different parameters that you must take into consideration while designing protocols for: [2+2]

(i) separation of compounds using TLC.

(ii) identification of compounds using spectrofluorimetry.

**Good luck**