Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

I SEMESTER M.Sc., CHEMISTRY END SEMESTER

EXAMINATIONS, NOV/DEC 2015

SUBJECT: ORGANIC SPECTROSCOPY[CHM 607]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE** full questions.
- Missing data may be suitable assumed.
- Draw diagrams and write equations whenever necessary

1A. Give reasons:

i) Oxygen – C_2H_2 flame is hotter than air – C_2H_2 flame

ii) Before taking atomic absorption spectrum of calcium, sodium or potassium salt is added to the solution

1B. i) Discuss the effect of polar and non- polar solvents on π (pi) $\longrightarrow$ π * and n $\longrightarrow$ π* transitions in the UV spectroscopy.

ii) Describe different modes of vibrations in the polyatomic molecules.

1C. Give reasons for the following;

i) The lifetime of a tungsten-halogen lamp is more than double that of an ordinary tungsten lamp.

ii) All three vibrational modes of H_2O are IR active.

iii) Broad peaks are observed in UV-Visible spectrum.

iv) Accuracy and resolution more in FTIR instrument than that of dispersive instruments.

2+4+ 4

2A. Differentiate between Stokes and anti-Stokes lines in the Raman spectroscopy

2B. With a neat diagram explain the working of double beam atomic absorption spectrometer. What are the advantages and disadvantages of AAS?

2C.What are the limitations of flame emission spectroscopy? Discuss two types of non-flame emission sources.

2+4+4

3A.How is Symmetry and Chirality of an organic molecule related? Give two examples.

3B. Discuss the construction & working of hollow cathode lamp. What are its limitations?

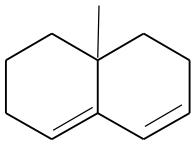
3C. Define the point group of a molecule. Draw and indicate all the symmetry elements present in the point group of ammonia, trans-dichloroethylene and benzene molecules.

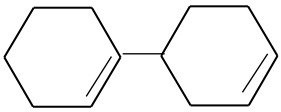
2+4+4

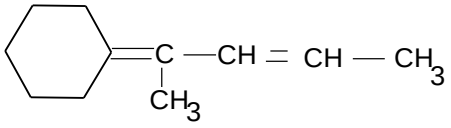
4A. Which of the following compounds are expected to absorb ultraviolet radiation? Explain your reasoning.

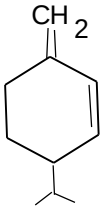
a) nitro-benzene b) n-hexane c) acetaldehyde d) aniline

4B. Compute the λ_{max} for the following compounds based on the Woodward Fieser rules for diene.

i) 

ii) 

iii) 

iv) 

4C. i) Calculate the approximate wave number of the fundamental absorption peak due to the stretching vibrations of a carbonyl group. The force constant for a double bond has an approximate value of 1 x 10^6 dynes/cm. The masses of carbon and oxygen atoms are 1 x10^{-23} and 2.6 x 10^{-23} g per atom.

ii) Explain the construction and working principle of the Photo cell and Golay detectors

2+4+4

5A. Give an account of the origin of atomic emission spectral lines of Na atom.

5B. i) Explain the background correction technique in AAS.

ii) Draw and explain the character table for C_{2v} point group

5C. Give an account of the following:

i) Flame atomization process & its limitations.

ii) Interferences in AES

2+4+4

6A. Define the following terms and discuss their significance

i) Fermi resonance ii) Auxochrome

6B. Discuss chemical and instrumental deviations from Beer's law.

6C. Show that $I = \mu r^2$ for a simple diatomic rigid rotator.

2 +4+4

****