UKA TARSADIA UNIVERSITY
M. Pharm Semester I Examination – June 2012
040030101/040050101 – MODERN ANALYTICAL TCHNIQUES

Max. Marks: 70

Instructions:
1. Attempt all questions.
2. Write each section in a separate answer book.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks.
5. Draw diagrams/figures whenever necessary.

Section-I

Q-1 (A)   Answer the following: [07]
1) What is the name given to the relaxation process due to an interaction between an excited nucleus and the magnetic fields caused by nuclei in molecules moving around in the sample?
2) Give the probable shift values and spin-spin coupling for propionic acid
3) How will you differentiate acetylene and acetonitrile using IR spectroscopy?
4) State the nitrogen rule
5) Give the base peak (m/e) for propylbenzene.
6) How many signals you will get for p-xylene on the basis of their proton decoupled CMR spectrum?
7) What is the most characteristic feature of mass spectra of compound containing bromine atom?

Q-1 (B)   Explain the following statements in brief: (Any 4)   [08]
1) Maldi is used to determine the molecular weight of proteins.
2) Anilinium cation exhibits UV spectrum almost similar to benzene.
3) OH stretching band is stronger than that of NH stretching band.
4) In CMR protonless carbon exhibit low intensity.
5) Aldehydic proton appears at high delta value.
6) Atomization is a critical step in atomic spectroscopy.

[10]

Q-2   Answer the following:

1) Identify the following compounds on the basis of the spectral data presented here.
    Show your reasoning for the conclusion arrived at.
        UV: 265 nm (€ = 450)
        IR: 3330, 2970, 2880, 1515, 1465, 813 cm^{-1}
        NMR: (δ) 1.12 d (6H) J=7.0 Hz
                2.28 s (3H)
                2.82 heptate (1H) J=7.0 Hz
                7.02 s (4H)
        CMR: 21.3, 24.2, 38.9, 126.6, 134.8, 145.7
        MS: M$^+$ 134, 119, 77.
                        OR
        IR: 3400-2600(broad), 1717, 1265, 914, 812, 636 cm^{-1}
1)   NMR: (δ) 3.0 t (2H)
                3.6 t (2H)
                Above 10 (broad) s (1H) Exchangeable
        CMR: 24.3 (t), 38.6 (t), 178.6 (S).
        MS: 154, 152, 135, 107, 73 (base), 55.

2) Describe with diagram principle and working of Michelson interferometer.
                        OR
2) Describe the factors affecting the chemical shift.

Q-3   Answer the following (Any 2)   [10]
1) Describe chemical ionization technique with its advantages and disadvantages.
2) What is plasma? Discuss inductively coupled plasma emission spectroscopy.
3) Explain Bragg's law. Describe X-ray sources.

                        Section-lI

Q-4. a. Define the following terms:

        i. Rresolution ii. Column selectivity   iii. Capacity factor   iv. Octane rule   [07]
        v. Exclusion limit   vi. Tracer   vii. Spacer arm

    b. Explain the following statements: (Any 4)   [08]
        i.   The internal diameter of the majority HPLC column is 4.6 mm.
        ii.   DTA helps in pre-formulation study.
        iii. The value of capacity factor k' should be in the range of 1 to 10.
        iv.   In EMIT step washings are not required.
        v.   High purity carrier gas is extremely important for good GC analysis result.
        vi.   I^{125} is most favored tracer in RIA.

Q-5   Answer the following: [10]
        a.   Enlist the factors affecting the efficiency of chromatographic separation. Describe
        eddy and longitudinal diffusion in detail.
                        OR
        a.   What is ion-exchange and ion-pair chromatography? Discuss the factors affecting
            the separation in ion-exchange chromatography.

b. Describe storage, handling and documentation of reference standard.

OR

b. Discuss principle, instrumentation and applications of DSC.

Q-6   Write short note on the followings (Any 2)   [10]
   1) Enzyme immune-assay
   2) Isoelectric focusing
   3) Optical rotatory dispersion

****