

**FACULTY OF SCIENCE**  
**M. Sc. I – Semester Examination, December 2013**

**Subject: Chemistry**

**Paper – IV : Biology and Spectroscopy**  
**(To be answered by the students without Biology in B.Sc.)**

**Time: 3 Hours**

**Max. Marks: 80**

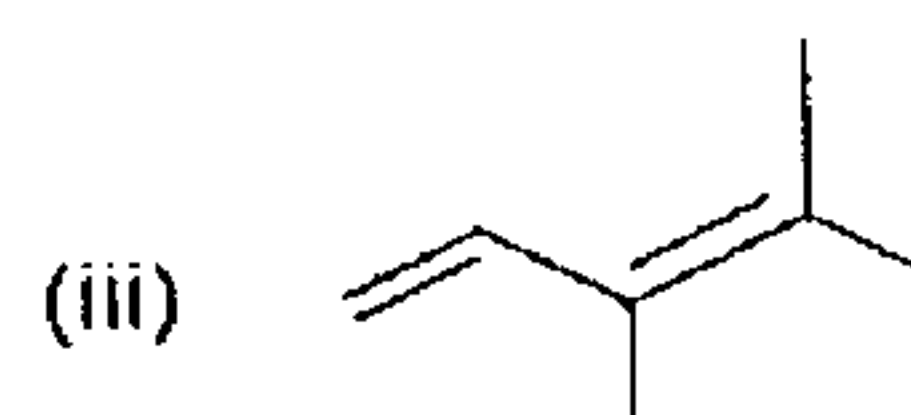
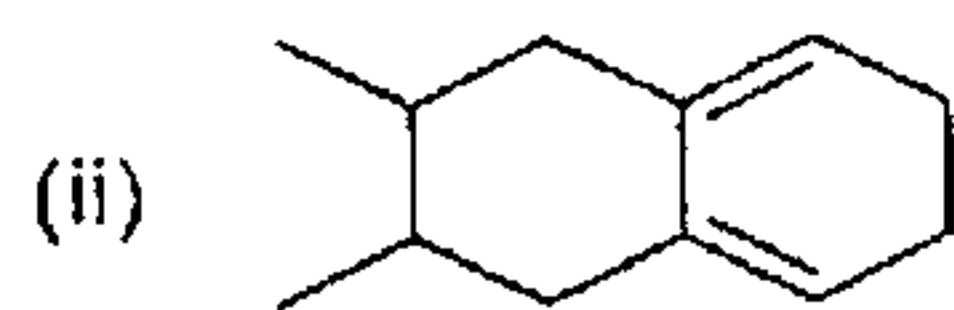
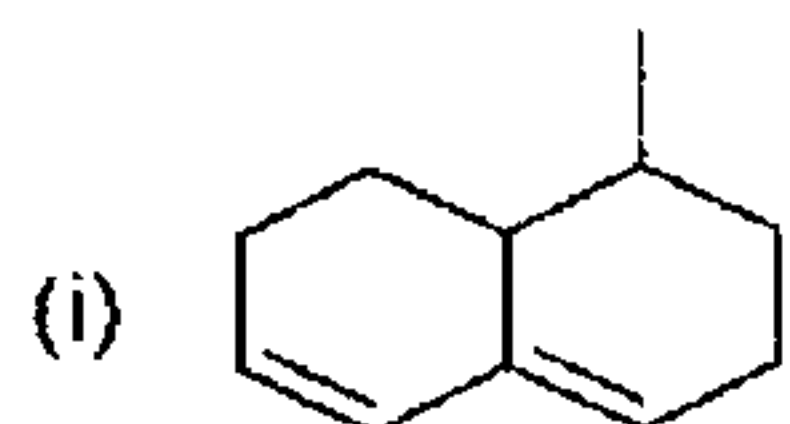
**Note :** Write all answer in one answer sheet only. Answer all questions.

**PART – A (4 x 8 = 32 Marks)**  
**(Short Answer Type)**

- 1.(a) Draw the prokaryote cell and label its sub cellular organelles. Mention the functions of mitochondria.
- (b) Give structure of ATP, ADP and AMP. Explain the functions of ATP.
- 2.(a) What are the factors affecting the spin spin coupling constant values?
- (b) How is the NMR spectroscopy useful in the study of fluxional molecules?
- 3.(a) Explain stoke lines and anti stoke lines in rotational spectroscopy.
- (b) Write a brief note on vibration-rotation spectra of diatomic molecules.
- 4.(a) How can you distinguish cis and trans isomers by electronic spectroscopy?
- (b) Explain bathochromic shift and hypsochromic shift.

**PART – B (4 x 12 = 48 Marks)**  
**(Essay Answer Type)**

- 5.(a) Explain the difference between glycolysis and glycogenolysis. Provide schematic diagram of glycolysis.
  - (b) Write a note on Western blotting.
- OR**
- (c) What is genetic code? Give its significance in the protein biosynthesis.
  - (d) Write a note on marker enzymes.
- 6.(a) Explain the NMR spectra of (i) Ethyl benzene (ii) Benzoic acid.
  - (b) Define spin-spin coupling and explain vicinal, geminal and long range couplings.
- OR**
- (c) Discuss the applications of NMR spectroscopy with reference to (i) Hydrogen bonding (ii) Proton-exchange process
  - (d) Explain the NMR spectrum of  $[H Ni(OPEt_3)_4]$ ,  $[H Rh (CN)_5]^{3-}$
- 7.(a) The force constant of  $H^1Cl^{35}$  is  $483 Nm^{-1}$ . Calculate the fundamental vibrational frequency of HCl(in  $cm^{-1}$ ).
  - (b) Explain (i) fundamental bands (ii) overtone bands and (iii) Fermi resonance
- OR**
- (c) Write a note on different stretching and bending modes of molecules.
  - (d) Discuss the classification of molecules based on moment of inertia and principle of microwave spectroscopy.
- 8.(a) Calculate the  $\lambda_{max}$  for the following molecules.



- (b) How the Beer's Law is useful to calculate the dissociation constant of weak acid? Explain.

**OR**

- (c) Discuss the electronic spectroscopy of  $3d^3$  hexa aquo complex and analyze it.
- (d) Explain different types of electronic transitions.

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