



(Pages : 3)

8481

Reg. No. : .....

Name : .....

Third Semester M.Sc. Degree Examination, February 2015  
Branch : Chemistry  
CH/CL/CA 232 : ORGANIC CHEMISTRY – III  
(2013 Admission Onwards)

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer **any two** among (a), (b) and (c) from **each** question. **Each** sub-question carries **2** marks.

1. a) Give the names of two commonly used solvents in IR spectroscopy. Water and ethanol are not used commonly in IR spectroscopy. Give reason.  
b)  $\lambda_{\text{max}}$  values of the two geometrical isomers of stilbene ( $\text{C}_6\text{H}_5\text{CH}=\text{CHC}_6\text{H}_5$ ) are 278 and 294. Correlate the isomers with the corresponding  $\lambda_{\text{max}}$  and give reasons.  
c) Give the base peak or the most abundant peak in the mass spectrum of toluene.
2. a) Account the fact that the  $\delta$  value of an aromatic H (6 – 8.5 ppm) is higher than a vinylic H (4.6 – 5.9) in PMR spectrum.  
b) Illustrate the statement “Chemically equivalent but magnetically non-equivalent protons” with suitable example.  
c) Give one reason why  $^{13}\text{C}$  NMR is less sensitive than  $^1\text{H}$  NMR.
3. a) Discuss the term “hydrophobic interactions” with respect to protein structures.  
b) What are molecular tweezers ? Give any two applications.  
c) Explain supramolecular liquid crystals.

P.T.O.



4. a) Illustrate retrosynthesis with an example.  
b) Differentiate in-silico and in-vitro analysis of drugs.  
c) Predict the sign of the constant  $\rho$  in the Hammett equation for the reaction,  
$$\text{Ar} - \text{H} + \text{NO}_2^+ \rightarrow \text{Ar} - \text{NO}_2 + \text{H}^+$$
5. a) Write any four basic principles of green chemistry.  
b) What types of vessels are used in microwave synthesis and give reasons ?  
c) What are ionic liquids ?
- (2×10=20 Marks)

### SECTION – B

Answer either (a) or (b) of each question. Each question carries 5 marks.

6. a) Explain how a polar solvent shifts the wavelengths of  
i)  $\pi \rightarrow \pi^*$  and  
ii)  $n \rightarrow \pi^*$  transitions.  
b) Write the fragmentation pattern to account the major peaks of each of the following compounds.  
i)  $\text{CH}_3\text{CH}_2\text{COOCH}_3$ ;  $m/z = 57, 59$  and  $88$   
ii)  $\text{CH}_3\text{CH}_2\text{NHCH}_2\text{CH}_2\text{CH}_3$ ;  $m/z = 30, 44, 58, 72$  and  $87$
7. a) Account the following :  
i) In PMR spectra,  $\delta$  value of the olefinic protons of cis-stilbene is at 6.55 ppm, whereas the  $\delta$  value of the olefinic protons of trans-stilbene is at 7.10 ppm.  
ii) 1, 2 dibromoethane and cyclohexane have single sharp signals in PMR although they have conformationally different Hydrogens.  
b) Deduce the structure of a compound  $\text{C}_8\text{H}_8\text{O}$  which gives  $^1\text{H}$  NMR data as  $\delta$  7.28 (5H, multiplet), 2.8 (2H, doublet), 9.78 (1H, triplet) ppm.
8. a) Discuss briefly the importance of molecular recognition in DNA and protein structure.  
b) Write short notes on the following types of interactions in molecular recognition  
i)  $\pi$ -stacking  
ii) hydrogen bonding



9. a) Explain briefly on "combinatorial organic synthesis".  
b) "Natural products have played a key role as a source of novel drugs or lead compounds for the development of drugs". Justify this statement briefly with suitable examples.
10. a) What is sonochemical synthesis ? Explain any two applications.  
b) Write short notes on :  
i) Green solvents  
ii) Scavenger resins
- (5×5=25 Marks)**

### SECTION – C

Answer **any three** questions. **Each** question carries **10** marks.

11. Describe briefly the major ion production techniques in mass spectrometry.
12. Predict the number of signal, relative chemical shifts and multiplicities in the PMR spectrum of the following compounds.  
i)  $(\text{CH}_3)_2\text{CHCOCH}_3$   
ii)  $\text{BrCH}_2\text{CH}_2\text{CH}_2\text{Br}$   
iii)  $p\text{-CH}_3\text{CH}_2\text{OC}_6\text{H}_4\text{NH}_2$   
iv)  $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$
13. Write short notes on the following synthetic molecular receptors.  
i) Cryptands  
ii) Calixarenes  
iii) Cyclophanes  
iv) Cyclodextrins
14. Write the synthesis of  
Chloramphenicol and phenobarbital
15. Explain in detail with examples of microwave synthesis as a green technology.  
**(3×10=30 Marks)**
-