

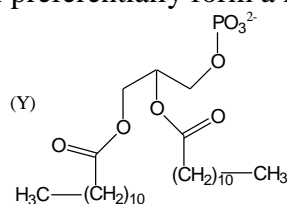
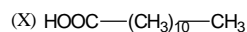
**Birla Institute of Technology & Science, Pilani, Rajasthan 333031**  
**Mid Semester Test**  
**II Semester, 2016-2017**

**Biophysical Chemistry, CHEM F323**  
**(Closed Book)**

**Time: 90 Min**

**Date: 09.03.2017**  
**Max. Marks: 30**

1. (a) His has three pKa values, pK<sub>1</sub>, pK<sub>2</sub> and pK<sub>3</sub> due to ionisable carboxyl, amino group and side chain respectively. Deduce the expression for its isoelectric point. 3  
 (b) Write the most appropriate chemical structure of naturally occurring alanine, that can be observed in its aqueous solution. 1  
 (c) The pKa values of Val are 2.3 and 9.7 for carboxyl and amino group respectively. Write qualitatively about the probable pKa values of Val-Ala-Ala-Val with explanation. 2  
 (d) Write short notes on Scale of average hydrophobicity for proteins. 2  
 (e) Explain point of zero net proton charge in context of titration of protein. 2
2. (a) Explain (using thermodynamics parameters) why nonpolar solute prefer to occupy the same cavity rather than remaining separated in water. 2  
 (b) Write down the major interaction(s) that may take place when two non bonded peptides will be brought from infinite separation to a close separation in vacuum. 2
3. (a) How many configuration(s) is/are possible for beta hairpin turn of a polypeptide? Explain in brief. 2  
 (b) What will be the most probable secondary structure of poly-Ile and why? 1  
 (c) Write the nature of interaction(s) that are present only in the tertiary structure but not in the secondary structure of proteins. 1  
 (d) Which class of molecules will follow Chargaff's rule and why? 2
4. (a) Write all the structural parameters that comprises the pseudo symmetry in Watson-Crick base pairing model of DNA. 2  
 (b) Which nucleic acid (DNA or RNA) is relatively less stable and why? 2
5. (a) An aqueous solution of a carbohydrate (18 g/100 mL) is found to be isotonic with another 100 mL aqueous solution containing 2.923 g of NaCl at 27 °C. Calculate the molecular weight of the carbohydrate assuming both the solution behaves ideally. 2  
 (b) Which one of the following amphiphiles will preferentially form a micelle in water and why? 2



(c) Short notes on Donan ratio. 2

-----The End-----Good Luck-----

Given: At. Wt.: Na = 23, Cl = 35.5

