Birla Institute of Technology & Science, Pilani, Rajasthan 333031
COMPREHENSIVE EXAMINATION
II Semester, 2016-2017

Biophysical Chemistry, CHEM F323 **Date: 11.05.2017**
PART I (CLOSED BOOK) **Time: 100 Min** **Max. Marks: 25**

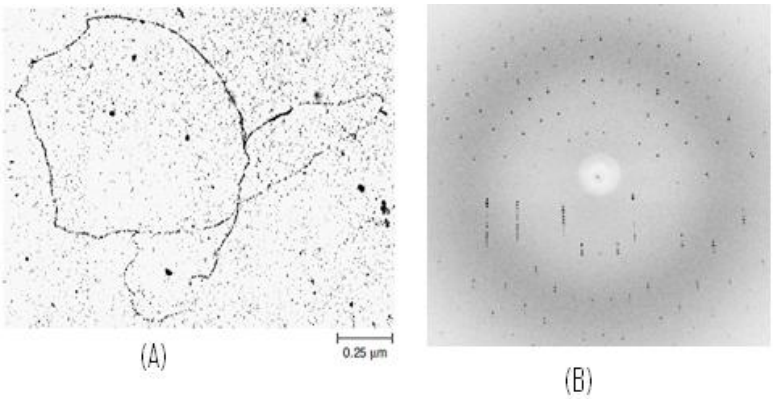
Answer all the questions, briefly and to the point

1. (a) Write down the points that need to be considered while functional mimicking of any enzyme. Explain the points suggested by you using any molecules that provide the catalytic reaction(s) similar to the enzymes. **3**
(b) Write your views whether solvent effects the molecular recognition or not with justification. **1**
(c) Write all the steps (without details) that involves in establishing the structure of a crystalline molecule using single crystal X-ray diffraction method. Also explain the problem(s) that may arise during the process. **2**
(d) The crystal structure of a given protein is reported by two researchers. The resolution of data reported by **researcher A** is 2 Å and that **by researcher B** is 5 Å. Which data is suppose to be more informative and why? **1**

2. (a) Deduce the expression of Induced dipole for the molecules having anisotropic polarizability (mention the details of symbol used). **2**
(b) Write short notes on the application of Raman spectroscopy in biological system. **1**
(c) Write the advantages of dielectric relaxation spectroscopy. **2**
(d) The correlation factor (g_c) of water is 0.25 in Debye relaxation region at room temperature. Explain what this value signifies about water using the expression of g_c. **1**

3. (a) Draw the protein landscape in two dimension and describe the folding processes starting from partial secondary and providing the significance of molten globule state. **4**
(b) Draw a schematic ϕ, ψ plot (show the labels of X, Y axis) showing the contour of isoenergy surface (sketch of one such contour will do) of allowed region for decaglycine. **2**
(c) Write the structural description (in words and/or block diagram; exact diagram not required) of 3'-UMP. **1**

4. (a) Write down the limitation(s) of Critical point drying of biopolymer. **1**
(b) Suggest a method to separate a mixture of 1 mol KCl and 1 mol $CaCl_2$ using non-aqueous solvent. Justify in brief. **1**
(c) Write short notes on scattering vector in context of X-ray diffraction method. **1**
(d) Explain why the condensed phase monolayer domains are bright when observed in Brewster angle microscopy and the same domain is dark in fluorescence microscopy. **1**
(e) Write the name of the techniques that provides the image shown in Fig. 1A and 1B **1**



****The End of Part I (CB)****Start Part II (OB)****Good Luck****