

**Department of Biochemical Engineering and Biotechnology**  
**BBL 131: Principles of Biochemistry**  
**Minor Exam (I semester 2020-2021)**

**Max. Marks 30**  
**Max. Time 1 hr.**

**Instructions:**

- Start time is 6.50 pm and end time is 8.00 pm (1 hr. + 10 minutes for Scanning and Uploading).
- Write your name and entry number at the beginning of the answer script.
- Write all the answers sequentially and all parts of a question to be answered at one place.
- Write brief answers restricted to maximum six lines in addition to diagram if needed.
- Hand written answers have to be uploaded as a single document on the same platform (Microsoft Teams Assignments) with the file name: Entry number followed by your name. In case of any problem in uploading the document, you may send it at [pmishradbed@gmail.com](mailto:pmishradbed@gmail.com) but end time has to be 8 pm.

1a	How do non-covalent interactions play a role in flexibility as well as stability of biological molecules? What will be the problem if all the interactions in biological systems are of covalent nature? Explain giving two examples.	2
b	What is the structural difference between amylose and cellulose, amylopectin and glycogen? What is the significance of such structural differences?	2
c	Which carbohydrate residue do influenza viruses recognize? Which enzyme is responsible for freeing the virus to infect the cell?	2
d	What is the role of sialic acid in molecular targeting?	2
2a	Why cysteine when present in a protein, tends to form inter and intramolecular cross-links? Why proline is present in turns whereas valine and isoleucine are present in beta strands.	2
b	What is the organizing principle of Ramachandran plot? Why trans configuration of peptide bond is preferred? Why alpha helix present in protein is right handed?	2
c	What is the driving force for protein tertiary structure formation in cellular environment? How their folding occurs in cytoplasm and in the membrane?	2
d	What is Levinthal's paradox? What are protein covalent modifications that improve protein functions? Give 4 examples.	2
3a	What is the type of bond present between base-sugar residue, sugar-sugar residue and base-base residue in a polynucleotide?	2
b	How do you distinguish between a double and single stranded of DNA? What are the components required for transcription? What is the difference between coding strand of DNA and mRNA transcript?	2
c	What structural features of DNA make them more stable than RNA? Give the mechanism.	2
4 a	Which technique is used to determine lateral diffusion of membrane lipids/proteins? How do you calculate the distance traversed by them? Which technique is used to determine flip-flop movement of lipids?	2
b	What are rafts? Do you think all proteins covalently attached to the membrane will be part of rafts? Name any two proteins attached to rafts.	2
c	A bacterial strain is grown at 37 <sup>0</sup> C, in the presence of saturated fatty acids, unsaturated fatty acids, short chain fatty acids and long chain fatty acids as a sole source of carbon. If bacterial culture is shifted to 15 <sup>0</sup> C, what changes in membrane	2

	lipid will be observed and why?	
d	What is the difference between simple diffusion and facilitated diffusion; primary and secondary active transport? Why membrane acts as a barrier for the diffusion of hydrophilic molecules and how this barrier is overcome?	2