

Ref No: Ex/SC/PHY/UG/DSE/TH/02/4C/2022(S)
B.Sc. PHYSICS THIRD YEAR SECOND SEMESTER SUPPLEMENTARY EXAM- 2022
Biological Physics

Time: 3 hours

Full Marks: 80

Answer any 4 questions

1. (a) What are phospholipids? Give two examples with their chemical structures. Explain why saturated lipids exhibit higher chain melting transition compared to unsaturated lipids
(b) Draw the phase diagram of lipid-water system. Describe the characteristics of each phase that lipid-water system exhibits. Explain how the structure and properties of the membrane in different phases get modified if cholesterol is added to membrane.
(2 + 4 + 3)+(2+ 4 + 5)

2. (a) What are amphiphiles? Give examples and their uses. What are the driving forces of self-assembly of amphiphiles ? Starting from the free energy, establish the concept of critical micellar concentration of amphiphilic molecules.
(b) What are unilamellar vesicles? "Giant unilamellar vesicles cannot be seen under conventional optical microscopy" Explain.
(c) Explain briefly with ray diagram the principle of fluorescence microscopy.
(2+ 2 + 2+ 6)+ (2+2)+(4)

3. (a) What are the essential characteristics of life? What is the difference between the prokaryotic and eukaryotic cells?
(b) Describe the polymerisation process of amino acids to form peptides. How does the side chain influences the properties of the amino acids?
(c) What are the components of a nucleotide? Describe with a help of a suitable diagram. What is a gene?
(4+4)+(4+3)+(3+2)

4. (a) Explain why at least 3 nucleotides are necessary for each CODON.
(b) How is a viral genome different from a bacterial genome?
(c) How many stereoisomers are possible for a certain monosaccharide? Explain. Describe the formation of a maltose disaccharide from two glucose molecules.
(d) Describe the different weak interactions of biomolecules in aqueous systems.
(3+4+(3+4)+6)

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5. (a) Explain the Law of Law of Bergonne and Tribondeau.
(b) Describe with suitable diagram the effect of X-Ray on Protein and DNA.
(5+15)
6. (a) What are continuous and characteristic X-rays ?
(b) How continuous and characteristic X-rays can be generated in instrument ? Explain its importance.
5+(5+10)