WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 2nd Semester Examination, 2022

MCBACOR03T-MICROBIOLOGY (CC3)

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.

Answer Question No. 1 and any *four* from the rest

1. Answer any ***four*** questions from the following: 2×4 = 8
   (a) Pyridine facilitates mutarotation of Glucose. — Explain.
   (b) Name two aromatic amino acids and also draw their structures.
   (c) Draw the structure of sucrose in Haworth projection formula. Is this sugar reducing or non-reducing?
   (d) What is the importance of Iodine number?
   (e) Differentiate between Amylose and Amylopectin. Which one responds to Iodine test?
   (f) Do peptide bond has single bond character? Justify.
   (g) Write down the Haworth projection formula of maltose. Why is maltose called a reducing sugar?
   (h) Define turn over number of an enzyme.
   (i) What are the products formed when a triacylglycerol gets hydrolysed? Write down the relevant chemical equation.

2. (a) What are metalloproteins? 1
   (b) Give an example of an allosteric protein, which is not an enzyme. 1
   (c) What do you mean about the mechanisms of enzyme inhibition? 3
   (d) What does K_m value of an enzyme signify? 1
   (e) What are isozymes? Why are they needed? 2

3. (a) What is the role of cholesterol in determining the membrane properties? 2
   (b) Write down the reaction showing the inversion of sucrose. Why is this called inversion? 2
   (c) Do you find polysaccharides in bacterial cell wall? Which is it? 1
   (d) What is the difference between cellulose and chitin? 1
   (e) How many stereoisomers will be formed in (i) Threonine (ii) Cysteine? 1
   (f) What will be the pI of L-glutamate given that its $pKa_1 = 2.10$ $pKa_2 = 9.67$ and $pK_R = 4.25$? 1

4. (a) What are buffers? What are the components of a buffer solution? 2
   (b) Why are proteins stored in buffers having a particular pH? 1
   (c) Calculate the equilibrium constants of the hydrolysis of the following compounds at pH 7 and 25°C: 3
      (i) Phosphoenol pyruvate $(\Delta G^{\circ\prime} = -61.9\ \text{kJ/mol})$
      (ii) Glucose -1- phosphate $(\Delta G^{\circ\prime} = -20.9\ \text{kJ/mol})$
   (d) Why is ATP considered to be an energy-rich compound? 1
   (e) Calculate the pKa of lactic acid if [lactic acid] = 0.01 (M) and [lactate] is 0.087 (M) when pH is 5. 1

5. (a) How many chiral carbon atoms are present in α-D-glucose? 1
   (b) What are amylose and amylopectin? 1
   (c) What are sphingolipids? 1
   (d) Briefly explain the quaternary structure of proteins. 2
   (e) What are multienzyme complexes? 1
   (f) Define buffer capacity. 1
   (g) In terms of thermodynamic concepts, why is it more difficult to park a car in a small space than it is to drive it out from such a space? 1

6. (a) What are allosteric enzymes? Is it possible to determine the allosteric nature of an enzyme by using kinetic studies? If yes, how? 2
   (b) What are zymogens? Give two examples. 2
   (c) What is the significance of Iodine number of lipids? 1
   (d) Why do all amino acids except proline produce purple-coloured products on reacting with ninhydrin but proline gives a yellow-coloured compound on reacting with ninhydrin? 2
   (e) Show the phenomenon of mutarotation in D-glucose. 1

7. (a) Why is turn important in protein structure? 2
   (b) How do β pleated sheet differ from α-helix? 3
   (c) How can you detect amino acid separated through Thin Layer Chromatography? Give the concerned reaction. 3

8. Write the differences between $2\times4 = 8$
   (a) Lyase and Ligase
   (b) NAD and FAD
   (c) Storage lipids and Structural lipids
   (d) Homo polysaccharides and Hetero polysaccharides.

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

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