WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 2nd Semester Examination, 2021

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.
All symbols are of usual significance.

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

1. Answer any ***four*** questions from the following: 2×4 = 8

   (a) Distinguish between epimers and anomers.

   (b) What are coupled reactions?

   (c) Name two hydrophobic and two hydrophilic amino acids.

   (d) Write the expression where pH is related to pKa. Give the name of a physiological buffer.

   (e) Draw the Haworth projection formula of lactose. Mention about the redox properties of lactose.

   (f) Write down two features of the peptide bond.

   (g) Write down the structure of L-threonine in R/S nomenclature.

   (h) What are ω fatty acids?

2. (a) Give examples of reactions where (i) TPP, and (ii) NAD^+ are used as coenzymes. $1\frac{1}{2}+1\frac{1}{2}$

   (b) Explain the advantage of Induced Fit Model over Lock and Key Model. 3

   (c) Draw the chair form of Glucose. 1

   (d) Name one structural polysaccharide. Where is it found? 1

3. (a) What is the relation between standard free energy change and equilibrium constant? 1

   (b) Calculate the ΔG for the hydrolysis of ATP at pH 7 and 25°C under steady-state condition where concentrations of ATP, ADP and Pi are 10^{-3}, 10^{-4} and 10^{-2} respectively. (ΔG' for the reaction is -7700 calorie/mole). 3

   (c) Why are some compounds called energy-rich compounds? Give two examples with structures. 2

   (d) What are the concentrations of acetic acid and acetate ion in 0.2M acetate buffer, pH 5.00? (The pKa of acetic acid is 4.77) 2

4. (a) Write the reaction involved in Edman's degradation. 2

   (b) Give example of a biologically active peptide. Draw its structure. 2

   (c) What type of linkages are found in (i) Sucrose and (ii) Amylopectin? 2

   (d) Mention the salient features of α-helix. Which amino acids are helix-breaker? 2

5. (a) What is the reason behind addition of formaldehyde in formal titration of amino acids? Draw the titration curve of Glycine. 2+2

   (b) Define turn structure of protein. Why is it important in protein structure? 1+2

   (c) Name one non-standard amino acid acting as neurotransmitter. 1

6. (a) What is meant by physical denaturation of protein? 2

   (b) What is the significance of Gibb's Free energy in biochemical reactions? 2

   (c) State the use of (i) Mercaptoethanol and (ii) Hydrazine. 2

   (d) Which is the most abundant protein in our body? What type of structure does it have? 2

7. (a) Write the application of the following: $1\frac{1}{2}+1\frac{1}{2}$

   (i) Ninhydrin, (ii) Benedict's reagent.

   (b) Phosphoenolpyruvate is an energy rich compound — Explain. 2

   (c) Name the forces that stabilize tertiary structure of protein. 2

   (d) What is N-acetylneuraminic acid? 1

8. (a) Differentiate between fat and oil. 1

   (b) Differentiate between irreversible inhibition and competitive inhibition. 3

   (c) Identify the classes of the following enzymes: 2

   (i) Hexokinase, (ii) Amylase,

   (iii) Pyruvate decarboxylase, (iv) D amino acid oxidase.

   (d) Why does melting points of fatty acids decrease with their degree of unsaturation? 2

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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