WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 3rd Semester Examination, 2020, held in 2021

MCBACOR05T-MICROBIOLOGY (CC5)

MICROBIAL PHYSIOLOGY AND METABOLISM

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.

Question No. 1 is compulsory and answer any *four* questions from the rest

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

   (a) What is the difference between the number of ATP, NADH and/or NADPH produced in the Embden-Meyerhof pathway and in the Entner-Doudoroff pathway? Name a bacterium, which can utilize the ED pathway.

   (b) Mention two points of differences between bacterial and mitochondrial Electron Transport Chain.

   (c) What is the significance of methanogenesis?

   (d) What is the significance of anaplerotic reactions?

   (e) What is Pasteur Effect?

   (f) How does Hyperthermophile differ from a Psychrophile?

   (g) Write down the step in glycolysis inhibited by fluoride ions.

2. (a) Distinguish between hexokinase and glucokinase. 3

   (b) Write down one irreversible step in glycolysis. 2

   (c) What happens if malate-aspartate shuttle stops transporting reducing equivalents of NADH from cytosol to mitochondrial matrix? 3

3. (a) What are the enzymes present in the pyruvate dehydrogenase complex? 3

   (b) Fermentation necessitates the presence of a non-oxygen terminal electron acceptor — Explain. 3

   (c) What kind of fermentation takes place in human beings? 2

4. (a) Name any two end products of mixed acid fermentation. Give example of an organism showing such fermentation process. $1\frac{1}{2}$

(b) State the overall reaction of butanediol fermentation. Name a test used to check for its occurrence in a bacterial cell. $2\frac{1}{2}$

(c) Describe the secondary active transport involved in the uptake of glucose from the human intestine with a diagram. 4

5. (a) Compare mitochondrial ETC with bacterial ETC. 4

(b) What is an uniport? Give an example. 2

(c) What happens when pyruvate builds up faster than it can be taken up by the TCA cycle? 1

(d) What happens when a cell is treated with oligomycin? 1

6. (a) Differentiate between diffusion and osmosis with an example for each. 4

(b) Why can an antiporter also be called a cotransporter? Explain with diagrams. 2

(c) Explain a symporter with a diagram. 2

7. (a) State whether the following molecules undergo passive or facilitated diffusion : (i) oxygen; (ii) ethanol; (iii) Na^+. Explain your answer in each case. 6

(b) Glycolysis following EMP pathway is more advantageous than ED pathway. Explain. 2

8. (a) Write down the steps of the TCA cycle that involve a tricarboxylic acid and a dicarboxylic acid. $1\frac{1}{2}+1\frac{1}{2}$

(b) What is the step of glycolysis where a 6-carbon compound is split into 3-carbon compounds? Mention the enzyme and the co-enzyme needed for this step. 2

(c) Write down the reactions requiring NAD^+ in the TCA cycle. 3

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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