



**WEST BENGAL STATE UNIVERSITY**  
B.Sc. Honours 3rd Semester Examination, 2021-22

**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) Why group translocation process is advantageous over active transport? Give one example of group translocation process in *E. Coli*.
  - (b) What is reverse electron flow? Why it is necessary in Chemolithotrophy?
  - (c) How is nitrogenase synthesis and activity controlled by O<sub>2</sub>?
  - (d) Give one example of substrate level phosphorylation.
  - (e) Differentiate between Oxygenic and anoxygenic photosynthesis.
  - (f) What are the absorption spectrum of chlorophyll a and bacteriochlorophyll?
  - (g) Why does aerobic respiration repress anaerobic respiration?
  
2. (a) With hydrogen as an electron donor, why is the reduction of NO<sub>3</sub><sup>-</sup>, a more favourable reaction than the reduction of S<sup>0</sup>? 2
- (b) Where is the dissimilative nitrate reductase found in the cell? Which metal does it contain? 2
- (c) How do autogens make ATP from the synthesis of acetate? Explain with reaction. 4
  
3. (a) Write short notes on: 2×3 = 6
  - (i) Methanofuran
  - (ii) Nitrification
  - (iii) Anammox.
- (b) How does the compound nitrapyrin benefit both agriculture and the environment? 2

4. (a) Is there any evidence that the epibionts of green bacteria consortia are truly green sulfur bacteria? 2
- (b) Which coenzyme functions in C1 carriers in methanogenesis? 2
- (c) Briefly discuss the process of energy conservation in methanogenesis from acetate. 4
5. (a) Cite two methods to determine in sequence of ETC in bacteria.  $1\frac{1}{2}+1\frac{1}{2}$
- (b) What is Pasteur effect? 1
- (c) Facilitated diffusion is an example of enzyme catalyzed reaction. Justify. 2
- (d) What are the basic criteria needed to be fulfilled by a compound to be used as an uncoupler in ETC? 2
6. (a) How do the microorganisms protect their nitrogenase enzyme from oxygen inactivation? 3
- (b) What are anaplerotic reactions? 2
- (c) How ATP is generated from acetate in methanogenesis? 3
7. (a) How do organisms assimilate sulfur? How does assimilatory sulfate reduction differ from dissimilatory sulfate reduction? 2+2
- (b) Discuss three types of reaction involved in assimilation of Carbon by microorganisms. 3
- (c) In which part of the microbial cell Rusticyanin is found? 1
8. (a) Why purple sulfur bacteria is purple? Where would you expect to find these bacteria? 2
- (b) How do purple non-sulfur bacteria conserve their energy? 2
- (c) What kind of enrichment media is required to isolate the purple non-sulfur bacteria? 2
- (d) Name two genera of purple non-sulfur bacteria. 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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