

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1933

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Unique Paper Code : 2532012402

Name of the Paper : Microbial Physiology and Metabolism-II

Name of the Course : **Microbiology**

Semester : IV

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **five** questions.
3. **All** questions carry equal marks.
4. Attempt **all** parts of a question together.

1. a) Describe various families of phototrophic bacteria along with their properties. **10**

b) Write the biochemical reactions for the following enzymes (**any 4**): **2x4=8**

- i. ATP-citrate lyase
- ii. 2-oxoglutarate:ferredoxin oxidoreductase
- iii. Pyruvate:ferredoxin oxidoreductase
- iv. Fumarate reductase
- v. Pyruvate decarboxylase

2. a) Differentiate between the following (**any 3**): **5x3=15**

- i. Linear and Branched fermentation pathway
- ii. Oxygenic and Anoxygenic photosynthesis
- iii. Dissimilatory nitrate reduction and Ammonia assimilation
- iv. Homolactate and Heterolactate fermentation

b) Describe Red drop. **3**

3.a) What are chemolithotrophs? Give two examples each of aerobic and anaerobic chemolithotrophs. Explain energy production and reducing power generation in chemolithotrophs with the help of a suitable example. **2+2+8=12**

b) Briefly explain alternate nitrogenase. **3**

c) Give one word to the following statement (**any 3**): **1x3=3**

- i. Major light harvesting pigments of the cyanobacteria absorbing light between 550 and 650nm.
- ii. Measure of the absorbance of the pigment at different wavelengths of light is called
- iii. The rate of a physiological activity plotted against wavelength of light.

P.T.O.

- iv. Process by which cyanobacteria convert light energy into chemical energy, releasing oxygen as a byproduct.

4. a) Write short notes on the following (**any 2**):

6x2=12

- i. Calvin cycle
- ii. Electron transport in green bacteria
- iii. Mechanism of nitrogen fixation

b) Give the contributions of the following scientists (**any 3**):

2x3=6

- i. Robert Hill
- ii. Sergei Winogradsky
- iii. Carnahan
- iv. Zeikus and Wolfe

5. a) What are methanogens? Describe Barker's scheme of methanogenesis. Discuss the experimental evidence demonstrating that methane formation is coupled to ATP synthesis.

2+6+4=12

b) Fill in the blank:

1x4=4

- i. The final product of assimilatory nitrate reduction is ____.
- ii. Assimilatory nitrate reduction is primarily involved in ____.
- iii. An example of alcohol producing bacteria ____.
- iv. The most abundant protein on earth is ____.

c) What are mixotrophs?

2

6. a) Explain the flow of electrons during oxygenic photosynthesis in cyanobacteria with the help of a suitable diagram.

8

b) Describe phycobilisomes.

4

c) What is the Pasteur effect? Describe its molecular basis.

6