RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. THIRD SEMESTER EXAMINATION, MARCH 2021

SECOND YEAR [BATCH 2019-22]

Date : 16/03/2021 **MICROBIOLOGY [HONOURS]**

Time : 11 am – 1 pm **Paper : VI [CC 6]** Full Marks : 50

Group - A

Answer **any five** of the following questions: [5×2]

1. a) Define 'batch culture' and 'continuous culture'.

   b) What are Cofactors? How are they classified? [1+1]

   c) What is Pasteur effect?

   d) Write down the differences between homolactic and heterolactic fermentation pathways.

   e) What are mixotrophs?

   f) Name two electron donors for Sulphur bacteria?

   g) What is anti-vitamin? Explain with specific example.

   h) Compare and contrast symport and antiport. Which term best describes the transport system mediated by the Na^+,K^+-ATPase?

Group - B

Answer **any four** of the following questions: [4×10]

2. a) How can synchronous growth of a bacterial culture be obtained? In what way could a synchronously growing culture be useful for the electron microscopist who is trying to determine the cytological changes associated with bacterial growth?

   b) What are 'photolithoautotrophs' and 'photoorganoheterotrophs'? Explain with example.

   c) Classify bacteria on the basis of their temperature requirements. Explain each type with proper example.

   d) Discuss the various adaptation mechanisms of halophiles. [(1+2)+2+3+2]

3. The following data were recorded for the enzyme-catalyzed reaction S→P.

[S]	υ
(M)	(nmoles × liter^{-1} × min^{-1})
6.25× 10^{-6}	15.0
7.50× 10^{-5}	56.25
1.00× 10^{-4}	60
1.00× 10^{-3}	74.9
1.00× 10^{-2}	75

a) Estimate Vmax and K max .

b) What would υ be at $[S] = 2.5\times10^{-5} M$ and at $[S] = 5.0\times10^{-5} M$?

c) What would υ be at $5.0\times10^{-5} M$ if the enzyme concentration were doubled ?

d) The υ given in the above table was determined by measuring the concentration of product that had accumulated over a 10-minute period. Verify that υ represents a true initial (or "instantaneous") velocity. [4+2+2+2]

4. a) Write down the step of glycolysis where substrate level phosphorylation occurs.

b) What is PMF? How is it related to pH?

c) One important component of nucleic acid is generated in a carbohydrate metabolizing pathway – Justify briefly.

d) Name one inhibitor for each of glycolysis, TCA cycle and electron transport chain and the corresponding reactions inhibited. [3+2+2+3]

5. a) Discuss hydrogenotrophicmethanogenesis with flowchart?

b) Where does photosynthesis take place in bacteria?

c) What do you mean by reaction center chlorophyll? [5+2+3]

6. a) State the function of vitamin C and vitamin E in cellular metabolism.

b) State the name of an enzyme that contains vitamin B1 as cofactor and how does it work during the catalysis?

c) Mention the name of two different enzymes that contain PLP as cofactor.

d) How does the TPP associate with the proper functioning of TCA cycle?

e) Why the arsenic compounds considered as poisonous compounds?

f) What is provitamin? Give an example. [2+2+1+2+2+1]

7. a) Porins are a class of protein found in the outer membranes of many bacteria – comment briefly on its characteristic structure and function.

b) Write a brief account on ‘ABC Transporter’ system

c) Nature and function of sodium transport in prokaryotic world are different compared to what exists in eukaryotic species – elaborate.

d) Compare glucose transport through intestinal membrane versus proton transport in gastric lumen.

[2+2+3+3]

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