

# QUESTION BANK FOR M.Sc. I. Microbiology

(w. e. from June, 2019)

Academic year 2019-2020

Title of Paper: Metabolism

Paper: MICRO 4204

Credit: 04

Question: 100

Two marks question

1. Define Allosterism
2. In Calvin cycle, 1 molecule of glucose is formed from
  - a.  $6\text{CO}_2 + 30\text{ATP} + 12\text{NADPH}$
  - b.  $6\text{CO}_2 + 12\text{ATP}$
  - c.  $6\text{CO}_2 + 18\text{ATP} + 12\text{NADPH}$
  - d.  $6\text{CO}_2 + 18\text{ATP} + 30\text{NADPH}$
  
3. Define Photosynthesis
4. Define co-operativity
5. Define homotrophic cooperativity
6. Define Assimilation
7. Define Dissimilation
8. Where does light reaction take place?
  - a. Grana
  - b. Stroma
  - c. Cytoplasm
  - d. Endoplasmic reticulum
  
9. C3 and C4 plants differ with respect to
  - a. Number of ATP molecules consumed
  - b. First product
  - c. Substrate which accepts carbon dioxide
  - d. All
  
10. Photorespiration occurs in
  - a. Four cell organelles
  - b. Two cell organelles

- c. One cell organelle
- d. Three cell organelle

11. Photosynthesis occurs in

- a. Chloroplast
- b. Golgi body
- c. Endoplasmic reticulum
- d. Nucleus

12. Dinitrogenase reductase is a

- Monomer
- Dimer
- Trimer
- Tetramer

13. Dinitrogenase is a

- Monomer
- Dimer
- Trimer
- Tetramer.

14. The reaction of glutamate and  $\text{NH}_4^+$  to yield glutamine is catalyzed by

- Uridyltransferase
- Adenyltransferase
- Glutamate synthase
- Glutamine synthase

15. Respiration carried out in absence of oxygen is

aerobic respiration

anaerobic respiration

cellular respiration

i. fermentation

16. The first product of C4 pathway is

- a. PGA
- b. DHAP
- c. Oxaloacetate

17. Phosphoenolpyruvate

18. Water-soluble photosynthetic pigment is

- a. Chlorophyll a
- b. Xanthophyll
- c. Anthocyanin

d. Chlorophyll b

19. Classification of organisms as oxygenic or anoxygenic during photosynthesis is based on \_\_\_\_\_

- a) The presence of  $\text{CO}_2$
- b) The generation of oxygen
- c) The presence of light
- d) The presence of water

20. When the velocity of enzyme activity is plotted against substrate concentration, which of the following is obtained?

- a) Hyperbolic curve
- b) Parabola
- c) Straight line with positive slope
- d) Straight line with negative slope

21. Respiration results in \_\_\_\_\_

- Release of oxygen
- Anabolism
- Release of carbon dioxide
- Transfer of carbon dioxide

22. Define anaerobic respiration

Four marks question

1. Explain in brief the Process of Sulfate reduction
2. Elaborate the biosynthesis of Pyruvate family of amino acid
3. Describe Various reaction in nitrogen cycle
4. Describe the properties of nitrogenase enzyme.
5. Explain in brief process of  $\text{NO}_3$  respiration.
6. Outline the pathway of Arginine biosynthesis
7. Describe any two reactions involved in assimilation of ammonium.
8. Describe the structure of nitrogenase enzyme complex.
9. How is ammonia assimilated into biomolecules
10. Explain the concept of allosterism giving suitable example.
11. Describe different types of cooperativity exhibited by allosteric enzymes.
12. Short note on Allosteric Regulation
13. Short note on types of mechanism in two substrate enzyme catalysed reaction
14. Discuss the steps involved in King-Altman approach to derive two substrate enzyme catalysed reaction
15. Compare and contrast between MWC & KNF model of allosteric enzyme.
16. Write a note on  $\text{C}_4$  plants.
17. Describe the photosynthetic apparatus of bacteria.
18. Write a note on photorespiration.

19. Describe the enzyme Rubisco.
20. Describe the structure of chloroplast.
21. Derive kinetics of allosteric enzymes
22. Write short on Hill Reaction
23. Explain structure of nitrogenase enzymes
24. Short note on Dark reaction
25. Short note on Water splitting Complex

#### Six marks question

1. How ammonia is assimilated into biomolecules
2. Explain concept of anaerobic respiration giving one example
3. Outline the biosynthesis of aspartate family of amino acids.
4. Short note on Histidine biosynthesis
5. Describe regulation of glutamine synthetase in *E. COLI*.
6. Describe the biosynthesis of amino acid valine.
7. Schematically represent biochemical mechanism of biological nitrogen fixation.
8. Describe the energy generation pathway in carbonate reducing bacteria
9. Describe the energy generation pathway in methanogens.
10. Diagrammatically illustrate the Z-scheme involved in photosynthesis.
11. Compare oxygenic and anoxygenic photosynthesis.
12. Diagrammatically illustrate ETC of photosynthetic plants.
13. Explain carbon assimilation in C<sub>4</sub> plants.
14. Diagrammatically illustrate the difference Between ETC of photosynthetic Plants and Photosynthetic bacteria
15. Short note on Regulation of clavin cycle
16. Describe non cyclic photophosphorylation
17. Write a note on photorespiration.
18. Describe different electron carriers involved in electron transport system of bacterial photosynthesis.
19. Write a note on CAM plants.
20. Describe the light reactions involved in plant photosynthesis.
21. Describe the process of noncyclic photophosphorylation in purple nonsulphur bacteria.
22. Ammonia Assimilation with respect to Glutamine Synthetase
23. Describe different types of co-operativity exhibited by allosteric enzymes
24. Differentiate between C<sub>3</sub> and C<sub>4</sub> pathway
25. Explain concept of anaerobic respiration giving one example
26. Derive the velocity equation for following reaction using King Altman

approach-  
E+S

Twelve marks question

1. Describe energy generation pathway in sulfate reducing Bacteria Explain in brief ETC in NO<sub>3</sub> reducing Bacteria
2. Describe any five mechanisms adapted by various organisms to prevent oxidative damage to Nitrogenase.
3. Derive Hill equation for positive homotropic co—operative effect in allosteric protein
4. Diagrammatically show Calvin Cycle.
5. Justify, 'Cyclic electron flow through photosystem I leads to production of ATP instead of NADPH'.
6. Explain KNF model of allosteric enzymes
7. Diagrammatically illustrate Z scheme of electron transport in plants.
8. Describe in detail biochemistry of nitrogen fixation
9. Describe three phases of clavin cycle
10. Give example of allosteric enzymes and their significance in allosteric regulation
11. Schematically represent biochemistry of nitrogen fixation
12. Describe different electron carrier involved in electron system of Bacterial Photosynthesis
13. Write the importance of constructing purification chart during process of enzymes purification.
14. Describe the process of noncyclic photophosphorylation in purple nonsulphur bacteria.
15. Differentiate between ETC of photosynthetic plants & photosynthetic bacteria.
16. How are allosteric enzymes regulated? what is their significance
17. Describe the co-ordinated regulation of glutamate dehydrogenase, glutamine Synthase and Glutamine synthase during ammonia assimilation
18. Justify :Clavin cycle is energy demanding Pathway
19. The following results are obtained for an enzyme catalysed reaction

Substrate concentration (mM)	Initial velocity ( $\mu\text{M}/\text{min}$ )
$6.25 \times 10^{-6}$	15
$7.5 \times 10^{-5}$	56.25
$1 \times 10^{-4}$	60
$1 \times 10^{-3}$	74.9
$1 \times 10^{-2}$	75

Calculate  $K_m$  and  $V_{max}$

