REV-01
MBT/05/10

2023/12

SET A

M.Sc. BIOTECHNOLOGY
FIRST SEMESTER
BIOCHEMISTRY
MBT-102

[USE OMR SHEET FOR OBJECTIVE PART]

Duration: 3 hrs. Full Marks: 70

Objective

Time: 30 mins. Marks: 20

Choose the correct answer from the following: *1×20=20*

1. The general formula of carbohydrate is:
   a. $(CH_2O)n$ b. $(C_4H_2O)n$
   c. $(C_6H_2O)n$ d. None of the above
2. The glycosidic linkage present at branching site in glycogen is:
   a. α (1-6) b. α (1-4)
   c. β (1-6) d. None of the above
3. Which of the following is NOT an amino acid with sulphur group acid?
   a. Cysteine b. Proline
   c. Methionine d. All of the above
4. Peptide bond is:
   a. Rigid with partial double bond character b. Formed between Cα - Cα
   c. A water molecule is released d. All of the above
5. Rancidity of lipid-rich foodstuff is because of:
   a. Reduction of fatty acids b. Hydrogenation of unsaturated fatty acids
   c. Oxidation of fatty acids d. Dehydrogenation of saturated fatty acids
6. Which of the following enzyme works only in liver?
   a. Pyruvate dehydrogenase b. Glucose 1 phosphatase
   c. Succinate dehydrogenase d. Malate dehydrogenase
7. If the change in entropy has a positive value, then:
   a. Randomness increases b. Randomness remains same as in the beginning
   c. Randomness decreases d. Change in enthalpy has a negative value
8. If a reaction ends with gain in energy, such reactions are called:
   a. Exothermic b. Exergonic
   c. Has a positive change in G d. Only a and b
9. Which of the following is true for second law of thermodynamics?
   a. Randomness increases till it reaches its maximum b. Randomness remains same irrespective of the reaction
   c. Balance inside the system is created by release of energy to the environment d. Only a and c

10. Which of the following is an intermediate of glycogenesis?
    a. Acetoacetate
    b. Citrate
    c. Oxaloacetate
    d. Glucose 1 phosphate

11. Cellular pyruvate kinase enzyme is inhibited by:
    a. Low concentrations of ATP
    b. High concentrations of ATP
    c. Low concentrations of acetyl Co-A
    d. All of the above

12. In which organism does glycolysis occur?
    a. Anaerobic organism
    b. Aerobic organism
    c. Neither Anaerobic nor Aerobic organism
    d. Both a and b

13. ADP + Pi → ATP + H_2O (which one is NOT true?)
    a. Is an anabolic process
    b. Is a catabolic process
    c. Change in H is positive
    d. Is an endergonic process

14. Steroids are found in:
    a. Plants
    b. Animals
    c. Fungi
    d. All of the above

15. What is the general mechanism of an enzyme?
    a. It acts by reducing the activation energy
    b. It acts by increasing the activation energy
    c. It acts by increasing the pH
    d. It acts by decreasing the pH

16. What is the value of free energy change when the reaction is at equilibrium?
    a. More than 1
    b. Less than 1
    c. Equal to 0
    d. Equal to 1

17. Effect of temperature on enzyme activity give a:
    a. Hyperbolic curve
    b. Bell shaped curve
    c. Straight line with positive slope
    d. Straight line with negative slope

18. Glucokinase is found only in:
    a. Liver
    b. Muscles
    c. Heart
    d. All of the above

19. FAD is an example of:
    a. Succinate dehydrogenase
    b. NADH dehydrogenase
    c. Is a prosthetic group
    d. Both b and c

20. Tyrosine is a:
    a. Polar amino acid
    b. Non-polar amino acid
    c. Is a protein
    d. Both a and b

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Descriptive

Time : 2 hr. 30 mins. Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. Define glycolysis. Give the reactions of the pathway mentioning the correct enzymes. How many ATP's are synthesized when *one* molecules of glucose is completely oxidized to H_2O and CO_2? What is the fate of lactic acid during strenuous exercise and where the reaction occurs and why? 1+5+2+2=10

2. Define prosthetic group with the help of an example. Explain how enzyme catalyzes a reaction at low activation energy and bring about conversion of a substrate to product. Classify the class of enzymes with the help of examples. Draw the structure of sucrose and cephalin. 2+2+3+3=10

3. Explain the relation between change in G, H and S. Explain what is going to happen to change in G when ATP is converted to ADP and Pi which proceeds with the decrease in free energy of the system? How can you explain standard free energy change and what is the difference with free anergy change? Give formula for standard free energy change. 4+3+3=10

4. Explain the process of beta oxidation of even chain fatty acids (16-C). Is it possible to oxidize an odd chain fatty acid? Explain how the mechanism of odd chain is different from an even chain. Give the reaction. 5+1+4=10

5. Define carbohydrates and fatty acids. Classify carbohydrates with the help of example. Explain in brief how a glycosidic bond is formed with an example. Draw the structure of starch and TAG. 2+3+2+3=10

6. Classify amino acids based on its structure. How acidic amino acids are different from basic amino acids? What types of amino acids will be present in areas of proteins that is associated with a negatively charged molecule? Justify your answer. Explain how a peptide bond is formed. Write in brief about its properties. 4+1+3+2=10

7. Explain the electron transport chain. What are chemical uncouplers? How are they important to animals living in polar regions? Explain with the help of examples. Define and explain oxidative phosphorylation. What will happen if oligomycin is present during ATP synthesis? Explain. 4+2+2+2=10

8. Explain the process of non-cyclic photophosphorylation? What is the importance of C4 pathway? Justify your answer. Explain the process of C4 pathway with the help of a schematic diagram. Explain what is the importance of solar energy. 3+5+2=10

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