M.Sc. BIOTECHNOLOGY
FIRST SEMESTER (SPECIAL REPEAT)
BIOCHEMISTRY
MBT-102

SET A

[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:

$1 \times 20 = 20$

1. 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

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

3. $ADP + Pi \rightarrow ATP + H_2O$ (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

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

5. 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

6. What is the value of change in G when the reaction is at equilibrium?
   a. More than 1
   b. Less than 1
   c. Equal to 0
   d. Equal to 1

7. When velocity of the enzyme activity is plotted against substrate concentration, which of the following is obtained?
   a. Hyperbolic curve
   b. Parabolic
   c. Straight line with positive slope
   d. Straight line with negative slope

8. Photosynthesis is carried out by:
   a. All vascular plants
   b. Cyanobacteria
   c. Green pigment containing fungi
   d. All of the above

9. The end products of cyclic photophosphorylation is/are:
   a. ATP
   b. NADH
   c. NADPH
   d. Only a is correct

10. How many photons are used to transfer one pair of electrons?
    a. 2
    b. 3
    c. 4
    d. 5

11. 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

12. The glycosidic linkage between glucose in cellulose is:
    a. α (1-6)
    b. α (1-4)
    c. β (1-6)
    d. None of the above

13. Which of the following is an imino acid?
    a. Cysteine
    b. Proline
    c. Glutamic acid
    d. Phenylalanine

14. Peptide bond is:
    a. Rigid with partial double bond character
    b. Formed between $C\alpha$ - $C\alpha$
    c. A water molecule is released
    d. All of the above

15. Rancidity of lipids 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

16. Which of the following enzyme works both in ETC and TCA?
    a. Pyruvate dehydrogenase
    b. Isocitrate dehydrogenase
    c. Succinate dehydrogenase
    d. Malate dehydrogenase

17. If the change in entropy has a negative value, then:
    a. Randomness increases
    b. Randomness remains same as in the beginning
    c. Randomness decreases
    d. Change in enthalpy has a negative value

18. If a reaction ends with release of energy, such reactions are:
    a. Called exothermic
    b. Called exergonic
    c. Has a positive change in G
    d. Only a and b

19. 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

20. Which of the following is **not** an intermediate of TCA?
    a. Acetoacetate
    b. Citrate
    c. Oxaloacetate
    d. Succinyl Co-A

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(Descriptive)

Time : 2 hr. 30 mins.

Marks : 50

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

1. Classify enzymes with the help of examples and reactions. Explain how hydrophobic and hydrophilic amino acids are arranged in a protein found in aqueous medium. How acidic amino acids are different from basic amino acids? Give two examples each.   6+2+2=10

2. Define carbohydrates. Classify lipids with the help of example. Explain in brief how a glycosidic bond is formed. Draw the structure of starch and lecithin.   1+3+2+4=10

3. Explain in brief how plants and humans are at a balanced steady state on earth. Explain the process of non-cyclic photophosphorylation. Why do you think cyclic photophosphorylation is important to plants?   2+5+3=10

4. Explain the structure of B-DNA using a diagram. How RNA is different from DNA? Explain the types of RNA.   4+2+4=10

5. What happens when glucose undergoes complete oxidation to CO_2 and H_2O? Explain the process of oxidation of pyruvic acid with the help of a schematic diagram. Explain how the pathway is regulated.   2+6+2=10

6. Define holoenzyme, apoenzyme, co-enzyme and prosthetic group. Explain how enzyme catalyzes a reaction at low activation energy. Explain with the help of energy co-ordinate diagram. Derive Michaelis – Menten equation.   4+2+4=10

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

8. Explain the relation between change in G, H and S. Explain what is going to happen to change in G when the reaction proceeds with the decrease in free energy of the system? What is standard free energy change? Give its formula.   4+3+3=10

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