

U.G. 1st Semester Examination - 2020
Molecular Biology & Biotechnology
[HONOURS]
Course Code : MBBT-H-101-T-CCR-1
(Biochemistry and Metabolism)

Full Marks : 40 Time : 2½ Hours
The figures in the right-hand margin indicate marks.
Candidates are required to give their answers in their own words as far as practicable.

1. Answer any **five** of the following: $2 \times 5 = 10$
- a) Which amino acid(s) is/are responsible for characteristic absorption maximum of proteins at 280 nm?
 - b) Name an epimer of glucose. What are mucopolysaccharide? $1+1$
 - c) Structural polarity of the phospholipid molecules is responsible for their functional significance. Explain.
 - d) Name two biologically important molecules derived from cholesterol.
 - e) What is/are the experimental basis/bases for the double helical model of DNA structure?

- f) Considering energy produced per mass of fuel, which is a better source of energy – carbohydrates or fats and why?
 - g) Based on the structure, which of the following is more susceptible to alkaline degradation – ribonucleotide, deoxyribonucleotide or dideoxyribonucleotide and why?
 - h) Explain the role of Gluconeogenesis in stress induced diabetes.
2. Answer any **two** of the following: $5 \times 2 = 10$
- a) Draw and explain the structure of bacterial cell wall. Both cellulose and starch are polymers of glucose, but they have contrasting physico-chemical characteristic and functional properties. Explain. State the role of glycoprotein in cell signaling and activation of immune system. $2\frac{1}{2} + 1\frac{1}{2} + 1$
 - b) State the difference between Activity, Specific activity and Turnover number of an enzyme. What are the limitations of Induced fit model of enzyme activity? Give an instance, where active site of an enzyme is competitively blocked for therapeutic purpose. $2+2+1$

c) Schematically write the steps of Glycolysis. From the perspective of regulation, some irreversible steps of Glycolysis are very important. Explain. How the process of fermentation is essential for continuance of Glycolysis? $2\frac{1}{2}+1\frac{1}{2}+1$

d) What is the effect of disruption of mitochondrial inner membrane potential on Electron Transport Chain? Krebs cycle is a process, where the substrates are oxidized in a sequential manner, but concentration of the substrate remains unaltered. Explain. $2\frac{1}{2}+2\frac{1}{2}$

3. Answer any **two** of the following: $10\times 2=20$

a) Which forces stabilize the secondary and tertiary structure of a protein? Describe the different types of helical structures found in proteins. Differentiate between domain and motif. Give an example each of globular protein and fibrous protein. $2+5+2+1$

b) What are the structural differences between A-, B- and Z-form of DNA? Which spectroscopic technique(s) will you use to identify a specific form of DNA? Which form

of DNA resembles a double-stranded RNA structurally? Explain the Thermal denaturation and renaturation kinetics of DNA with a graph.

$$4\frac{1}{2}+1\frac{1}{2}+1+3$$

c) Explain the process of β -oxidation of fatty acids. How this process produce large amount of water? Why fats get deposited in our body when we eat carbohydrates in excess?

$$5+2\frac{1}{2}+2\frac{1}{2}$$

d) Differentiate between coenzyme and cofactors with example. Although vitamins cannot produce ATP directly (like carbohydrates, fats, etc.) doctors prescribe vitamins after prolonged illness or fatigue. Explain. What structural attributes enable enzymes from thermophilic bacteria (like Taq polymerase) show significant activity at extremely high temperature? Name the recently added seventh class of enzyme with an example. $3+2\frac{1}{2}+2\frac{1}{2}+2$
