



G1

M.Sc. BIOTECHNOLOGY
First Semester
BIOCHEMISTRY
(MBT - 102)

Duration: 3Hrs.

Full Marks: 70

Part-A (Objective) =20
Part-B (Descriptive) =50

(PART-B: Descriptive)

Duration: 2 hrs. 40 mins.

Marks: 50

Answer any four from Question no. 2 to 8
Question no. 1 is compulsory.

1. Define carbohydrates. Write the structure of glucose, fructose and maltose. Write the steps of Glycolysis. What is the fate of pyruvate when oxygen level in the muscles decreases? (1+3+6=10)
2. What are plant hormones? Mention the types of plant hormones? Explain the biosynthesis pathway of Auxin and Gibberelin. (2+2+6=10)
3. What is transamination? Explain how nitrogen is eliminated from the body. Describe the salvage pathway of purine biosynthesis. (2+5+3=10)
4. How can u differentiate between substrate level phosphorylation and oxidative phosphorylation? State and explain Chemiosmotic hypothesis of ATP synthesis. Write in brief about the components of ETC involved in electron transfer. (2+4+4=10)
5. Define reducing sugars, non – reducing sugars and glycosidic bond. Draw the structure of starch showing the bonds involved. Show schematically the steps involved in TCA cycle. (3+2+5=10)

6. What is Phenylketonuria? Mention the relation of PAH enzyme with PKU.
What are its symptoms, diagnosis and treatment procedure? (2+2+6=10)
7. What is photophosphorylation? Explain the dark reactions of photosynthesis.
Derive Michaelis Menten equation of enzyme kinetics. (1+4+5=10)
8. What is enzyme immobilization? What are the advantages and disadvantages?
Mention the area of application of immobilized enzymes. (2+4+4=10)



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Duration: 20 minutes

Marks – 20

(PART A - Objective Type)

I. Choose the correct answer:

1×20=20

- How do cells capture the energy released by cellular respiration?
(a) They store it in molecules of carbon dioxide.
(b) They produce glucose.
(c) The energy is coupled to oxygen.
(d) They produce ATP.
- The overall equation for the aerobic cellular respiration of glucose is
(a) $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 + \text{ATP} + \text{Heat}$
(b) $\text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{ATP} + \text{Heat}$,
(c) $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow \text{Lactic acid} + \text{ATP} + \text{Heat}$
(d) $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow \text{CO}_2 + \text{Ethyl alcohol} + \text{ATP} + \text{Heat}$
- Choose the site along electron transport chain out of the following that is not coupled with ATP synthesis.
(a) NADH – Co-Q reductase (b) Succinate Co-Q reductase
(c) Cytochrome bc_1 reductase (d) all of the above
- Choose a statement out of the following that best describes the uncouplers of oxidative phosphorylation.
(a) Uncouple ATP synthesis from PEP.
(b) Uncouple electron transport from oxygen reduction.
(c) Uncouple electron transport from ATP synthesis.
(d) Uncouple ADP/ATP translocation.
- During one Kreb's cycle number of carbon dioxide molecules released is
(a) 1 (b) 2 (c) 3 (d) 4
- DEAE cellulose is an example of
(a) Natural polymer (b) Synthetic polymer
(c) Matrix (d) Artificial polymer
- Carrageenan, a natural polymer is obtained from
(a) Brown Algae (b) Red Algae
(c) Fungi (d) Yeast
- Gibberelins are a group of tetracycline
(a) triterpenoid (b) diterpenoid
(c) hexaploid (d) alkaloid

9. The ring skeleton present in gibberelin is
 (a) ent- gibberellane (b) ant- gibberellane
 (c) ene- gibberellane (d) geranylgeranyl pyrophosphate
10. Sphingomyelins are found in the
 (a) Muscles (b) Nephrons
 (c) Brain tissue (d) Hepatocytes
11. The major lipids of the mitochondrial membranes are
 (a) lysophospholipid (b) inositol
 (c) cardiolipin (d) glycerol
12. 10% of the phospholipids of the brain and muscles are made up of
 (a) dipalmitoyl lecithin (b) diacylglycerol
 (c) plasmalogens (d) phosphatidylcholine
13. Gangliosides contain one or more molecules of
 (a) gangloside (b) citric acid
 (c) sialic acid (d) galactosylceramide
14. The Henderson- Hasselbalch equation
 (a) allows the graphic determination of the molecular weight of a weak acid from its pH scale.
 (b) does not explain the behaviour of di or tri basic weak acids.
 (c) employs the same value for pKa for all weak acids.
 (d) relates the pH of a solution to the pKa and the concentrations of acid and conjugate base.
15. Sulphur containing amino acids are
 (a) cysteine and methionine (b) methionine and threonine
 (c) cysteine and threonine (d) cysteine and serine
16. The backbone of DNA is
 (a) hydrophilic (b) hydrophobic
 (c) neutral (d) both hydrophilic and hydrophobic
17. The two nitrogen of urea are derived from
 (a) aspartate and ammonia (b) glutamate and ammonia
 (c) alanine and ammonia (d) aspartate and glutamate
18. Which of the following is a required substance for purine biosynthesis?
 (a) 5-methyl thymidine (b) ribose phosphate
 (c) PRPP (d) 5- fluoro uracil
19. Which of the following statements about Michaelis-Menten kinetics is correct?
 (a) Km, the Michaelis constant, is defined as the dissociation constant of the enzyme-substrate complex.
 (b) Km, the Michaelis constant, is defined as the concentration of substrate required for the reaction to reach maximum velocity.
 (c) Km, the Michaelis constant, is expressed in terms of the reaction velocity.
 (d) Km, the Michaelis constant, is a measure of the affinity the enzyme has for its substrate.

20. Cyclic photophosphorylation results in the formation of

(a) ATP

(b) NADPH

(c) ATP and NADPH

(d) ATP, NADPH and Oxygen
