
MBC 141 CAT 1

1st Semester 1429/1430 H

1. For a weak acid at $\text{pH} = \text{its pKa}$, the % of the dissociated form is:
 - (A) 10%
 - (B) 30%
 - (C) 50%
 - (D) 70%
 - (E) 90%
2. Which of the following is a hydroxyl-containing amino acid?
 - (A) Arginine
 - (B) Alanine
 - (C) Proline
 - (D) Tyrosine
 - (E) Histidine
3. Which one of the following amino acid substitutes glutamate in β subunit of hemoglobin in sickle cell disorder?
 - (A) Valine
 - (B) Leucine
 - (C) Lysine
 - (D) Methionine
 - (E) Isoleucine
4. The following is an imino acid:
 - (A) Phenylalanine
 - (B) Tryptophan
 - (C) Glycine
 - (D) Thionine
 - (E) Proline
5. Regarding denaturation of proteins:
 - (A) Denaturated proteins are often soluble
 - (B) Denaturation results in more folding of the protein
 - (C) Denaturation includes loss of primary structure
 - (D) Most denaturated proteins are irreversibly disordered
 - (E) Denaturation does not affect the function of proteins
6. Collagen type I is:
 - (A) A globular protein
 - (B) The most common type of collagen
 - (C) A network-forming collagen
 - (D) Deficient in glycine
 - (E) A soluble protein

7. All of the following statements concerning the peptide bonds are true, EXCEPT:
- It is an amide bond
 - It is rigid
 - It is uncharged and polar
 - It has partial double bond character
 - It is easily hydrolyzed by weak acids
8. The following tripeptide:
Valine - Leucine - Asparagine
- The tripeptide is maintained by three peptide bonds
 - The first amino acid is aspartic acid
 - The side chain of the first amino acid is polar.
 - The third amino acid is valine
 - The side chain of the third amino acid is negatively charged
9. All about the causative agent of Prion disease is true, EXCEPT:
- It forms insoluble β -sheet
 - It is highly resistant to proteolytic degradation
 - It has primary structure different from the non-infective type
 - It is not associated by nucleic acids
 - It causes transmissible spongiform encephalopathies
10. The rate of the reaction is said to be in zero order if:
- [S] is much less than K_m
 - [S] equals K_m
 - The velocity of the reaction is dependent on the substrate concentration
 - The velocity of the reaction is inversely proportional to enzyme concentration
 - The velocity of the reaction is constant and equals V_{max}
11. The effect of using "stains" on Lineweaver-Burke plot, most commonly shows:
- Increased V_{max}
 - Increased K_m
 - Decreased V_{max}
 - Decreased K_m
 - Increased the affinity between enzymes and their substrate
12. In a plot of [S] against V_i :
- Enzymes that obeyed Michaelis-Menten kinetics show sigmoid curves
 - Allosteric enzymes show hyperbolic curves
 - At $[S] = K_m$, the velocity equals V_{max}
 - When [S] is much less than K_m , the velocity is $V_{max}/2$
 - If the enzyme concentration is halved, V_i is reduced to half of the original
13. Regarding the mechanism of action of the following compounds, all of the following statements are true, **EXCEPT**:
- Statins are competitive inhibitors of HMG CoA reductase.
 - β -Lactam antibiotics inhibit cell wall synthesis
 - ACE inhibitors decrease the level of angiotensin II
 - Lead is a competitive inhibitor of ferrochelatase
 - The neurotoxic effects of a certain insecticides are due to non-competitive inhibition of acetylcholine esterase
14. As regards heterotropic effectors:
- The substrate itself serves as allosteric effector
 - Binding of the effector takes place at the active site
 - They always increase the rate of enzyme activity
 - They bind by covalent bond to the enzyme
 - They can cause feedback inhibition

15. Which of the following enzymes is the most specific for myocardial infarction?
- (A) ALT
 - (B) CK1(BB)
 - (C) CK2(MB)
 - (D) CK3(MM)
 - (E) Troponin.
16. ???
- (A) ???
 - (B) ???
 - (C) ???
 - (D) ???
 - (E) ???
17. ???
- (A) ???
 - (B) ???
 - (C) ???
 - (D) ???
 - (E) ???
18. The ??? isomer of glucose
- (A) Galactose
 - (B) Ribose
 - (C) Mannose
 - (D) Maltose
 - (E) Fructose
19. The main monosaccharide in human body is:
- (A) Galactose
 - (B) Ribose
 - (C) Lactose
 - (D) L-glucose
 - (E) D-glucose
20. The α amylase can hydrolyze:
- (A) α (1-4) bond
 - (B) β (1-4) bond
 - (C) α (1-6) bond
 - (D) β (1-6) bond
 - (E) Disaccharides
21. Thermogenin:
- (A) Is abundant in white adipose tissue
 - (B) Binds to ATP synthase, inhibiting its activity
 - (C) Allows protons to reenter the mitochondrial matrix without ATP production
 - (D) Allows efficient utilization of energy to generate more ATP, hence its name
 - (E) Has an important function specially in adult humans
22. Regarding malate-aspartate shuttle:
- (A) The mitochondrial malate dehydrogenase is FAD-dependant
 - (B) The inner mitochondrial membrane is freely permeable to oxaloacetate
 - (C) The 2 electrons of cytosolic NADH are carried on aspartate
 - (D) Using this shuttle, cytosolic NADH gives rise to 3 ATP via ETC
 - (E) Dihydroxyacetone phosphate is a component of the shuttle

23. Adenylyl cyclase can be activated by:
- (A) cAMP
 - (B) Phosphorylation
 - (C) Glucagon
 - (D) GDP
 - (E) β - γ subunits of Gs
24. The inactivation of G-protein is due to:
- (A) The effect of phosphodiesterase on Gs complex
 - (B) The inherent GTPase activity of its α -subunit
 - (C) The separation of β - γ subunits from the α subunit
 - (D) The association between Gs and Gi
 - (E) The exchange of GTP for GDP
25. In the presence of O₂, glycolysis in hepatocytes produce a net of:
- (A) 2 ATP
 - (B) 4 ATP
 - (C) 6 ATP
 - (D) 8 ATP
 - (E) 10 ATP
26. Regarding glucokinase:
- (A) It is stimulated by glucose-6-phosphate
 - (B) It is inhibited by fructose-6-phosphate
 - (C) It is activated by binding to a regulatory protein in the nucleus
 - (D) It is stimulated indirectly by hypoglycemia
 - (E) It is repressed by increased insulin/glucagon ratio
27. Regarding phosphofructokinase-2/fructose biphosphatase-2 (PFK-2):
- (A) It is a dimeric protein
 - (B) It converts fructose-6-phosphate into fructose 1,6 biphosphate
 - (C) It is the rate -limiting enzyme of gluconeogenesis
 - (D) Its kinase activity is inhibited by insulin
 - (E) Its phosphatase activity is stimulated by glucagon
28. Which one of the following enzymes can catalyze substrate-level phosphorylation in the mitochondria?
- (A) Hexokinase
 - (B) Phosphofructokinase-1
 - (C) Phosphoglycerate kinase
 - (D) Pyruvate kinase
 - (E) Succinate thiokinase
29. Regarding the regulation of pyruvate dehydrogenase multi-enzyme complex:
- (A) The active form is the phosphorylated enzyme
 - (B) It is inhibited by high NAD⁺/NADH
 - (C) It is stimulated by excess acetyl Co-A
 - (D) It is inhibited by high ADP
 - (E) It is activated by calcium
30. Using TCA cycle, oxidation of one molecule of acetyl Co-A into CO₂, and H₂O would produce:
- (A) 6 ATP
 - (B) 8 ATP
 - (C) 12 ATP
 - (D) 24 ATP
 - (E) 38 ATP

31. Regarding lactic acidosis, all the following statements are correct, **EXCEPT**:
- (A) Acquired form is due to deficiency of lactate dehydrogenase
 - (B) Congenital form is due to deficiency of pyruvate dehydrogenase complex
 - (C) There is an impairment of oxidative phosphorylation
 - (D) Muscular spasticity is a manifestation of the congenital form
 - (E) Blood lactate level can be used to monitor the patient's recovery
32. Methionine is a glucogenic amino acid that can form glucose by joining Kerb's cycle at:
- (A) Pyruvate
 - (B) α -Ketoglutarate
 - (C) Succinyl Co-A
 - (D) Fumarate
 - (E) Oxaloacetate
33. During gluconeogenesis, pyruvate is converted to phosphoenol pyruvate (PEP) by:
- (A) Pyruvate kinase
 - (B) Pyruvate dehydrogenase
 - (C) Pyruvate decarboxylase
 - (D) Alanine aminotransferase
 - (E) Pyruvate carboxylase and PEP-carboxykinase (PEP-CK)
34. In humans, pyruvate is a substrate for all of the following enzymes, **EXCEPT**:
- (A) Pyruvate kinase
 - (B) Pyruvate dehydrogenase complex
 - (C) Pyruvate decarboxylase
 - (D) Alanine aminotransferase
 - (E) Lactate dehydrogenase
35. Regarding transport of monosaccharides in and out of cells:
- (A) Glucose uptake by intestinal mucosal cells occurs by simple diffusion
 - (B) Insulin is essential for the intestinal absorption of glucose
 - (C) The intestinal uptake of both galactose and fructose occurs by active diffusion (energy-dependant)
 - (D) Both glucose and galactose use GLUT-3 for transport from intestinal cells to portal circulation
 - (E) GLUT-5 is the primary transporter for fructose in the intestine

True & False Qs

1.
 - a. In protein found in aqueous solutions, the side chains of non-polar amino acids are present in the interior (inside) of the proteins
 - b. Asparagine is an acidic amino acid
 - c. The secondary structure of protein is maintained by hydrogen bonds
 - d. Deficiency of α 1-antitrypsin may lead to emphysema
 - e. The quaternary structure of protein is stabilized by covalent and non-covalent bonds

2.
 - a. The optimum pH is the same for all enzymes
 - b. Some enzymes are RNA in nature
 - c. High acidity in the stomach activates the salivary α amylase
 - d. Mutarotation is the inter conversion of the α - and β -anomers of a sugar
 - e. Synthesis of ATP via ETC is accompanied with dissipation of both pH and electrical gradient across the inner mitochondrial membrane

3.
 - a. ??? -4 of skeletal muscle and adipose tissue is insulin sensitive
 - b. Pyruvate kinase deficiency is the second most common cause of the enzyme deficiency-related hemolytic anemia
 - c. ??? mainly catabolic but has some anabolic features
 - d. ??? increased formation of 2,3 BPG as a byproduct of glycolysis in RBCs, ???
 - e. GTP lead to persistent (irreversible) activation of G-proteins