



**KISII UNIVERSITY**  
**UNIVERSITY EXAMINATIONS**

**SECOND YEAR EXAMINATION FOR THE AWARD OF THE DEGREE**  
**BACHELOR OF SCIENCE IN CLINICAL MEDICINE AND SURGERY**  
**THIRD SEMESTER 2022/2023**  
**[MAY-AUGUST, 2023]**

**BIOC 112: BIOCHEMISTRY II**

**STREAM: Y2S3**

**TIME: 2 HOURS**

**DAY: THURSDAY, 2:00 – 5:00 PM**

**DATE: 27/07/2023**

**INSTRUCTIONS**

**1. Do not write anything on this question paper.**

1. PART I: SECTION A: 6 SHORT ANSWER QUESTIONS  
SECTION B: 3 LONG ESSAY QUESTIONS, ANSWER ANY TWO  
PART II: 60 MULTIPLE CHOICE QUESTIONS. CHOOSE ONE CORRECT  
RESPONSE  
PART I

**SECTION A (30 MARKS)**

**SHORT ANSWER QUESTIONS (ANSWER ALL QUESTIONS)**

1. Discuss the role of high energy phosphate bonds in metabolism.
2. Briefly describe the significance of the reducing equivalents NADH<sub>2</sub> and FADH in metabolism of lipids.
3. Describe the condition referred to as Marple syrup disease in infants.
4. Briefly describe the significance of changes in free energy in metabolism.
5. Explain why most metabolic processes occur as Redox.
6. With the help of a well labeled diagram describe the structure of ATP.

**SECTION B. ANSWER ANY TWO QUESTIONS. (40 MRKS)**

1. Describe the events that occur during the glycolytic pathway, clearly explaining the different products of this pathway.
2. What is the condition that is referred to as ketoacidosis and does it occur in the body, clearly stating the products of this condition
3. Discuss how the different aminoacids are channeled during their catabolism in the body.

**PART I (60 MULTIPLE CHOICE QUESTIONS) (60 MARKS)**  
**CHOOSE ONE CORRECT RESPONSE**

1. Which of the following is NOT a product of degradation of pyrimidine bases
  - A. uracil
  - B. ammonia
  - C. carbon dioxide
  - D. beta-alanine
2. Which of the following is NOT a degradation product of Thymine
  - A. carbon dioxide
  - B. water
  - C. methyl-alanine
  - D. lactose
3. What is the end product of glycolysis
  - A. pyruvate
  - B. lactate
  - C. water
  - D. All of the above
4. How many ATPs are produced during glycolysis
  - A. 4
  - B. 2
  - C. 0
  - D. ALL of the above
5. How does the body get its carbohydrates
  - A. Diet
  - B. Glycogen
  - C. Starch
  - D. ALL of the above
6. In which of the following organs does digestion of carbohydrate starch
  - A. Stomach
  - B. Duodenum
  - C. Intestines
  - D. None of the above
7. Which of the following hormones are involved in glucose metabolism
  - A. Amylase
  - B. glucagon
  - C. Insulin
  - D. dystrophin
8. The amount of energy released by the hydrolysis of one thioester linkage is equivalent to:
  - A. -14.6Kcal/mol
  - B. +14.6Kcal/mol
  - C. -7.3Kcal/mol
  - D. +7.3Kcal/mol

- 10.. Which of the following are NOT a disease caused by an inherited disorder in glycogen metabolism
- A. Von GIERKES
  - B. TYPE 1A
  - C. POMPE
  - D. None of the above
10. Which of the following intermediates activates Acetyl CoA
- A. Oxaloacetate
  - B. Citrate
  - C. Succinyl CoA
  - D. None of the above
11. Which of the following is NOT a product in the glycolytic pathway
- A. carbon dioxide
  - B. water
  - C. ATP
  - D. citrate
12. Which of the following is a storage form of a homopolysaccharide in plants
- A. glycogen
  - B. starch
  - C. collagen
  - D. mannose
13. The presence of an asymmetric carbon confers what of the following
- A. solubility
  - B. optical activity
  - C. crystallization
  - D. All of the above
- 14 . Which of the following is an isomer of glucose
- A. mannose
  - B. galactose
  - C. glucose
  - D. All of the above
15. Which of the following bonds hold together a peptide linkage
- A. glycosidic
  - B. phosphodiester
  - C. hydrogen
  - D. None of the above
16. Which of the following enzymes is involved in glycogenolysis
- A. phosphorylase
  - B. synthase
  - C. lyase
  - D. None of the above
- 17 .Which of the following enzymes is involved in glycogenesis
- A. Glycogen synthase
  - B. Glycogen phosphorylase
  - C. Glycogen Glucosidase

- D. All of the above
18. Which of the following is a disease associated with glycogen metabolism
- Type O
  - Ketonuria
  - Gout
  - Kwarshiorkor
19. Glycogen is the most abundant polysaccharide in
- animal cells
  - plant cells
  - prokaryotes
  - All of the above
20. Which condition is likely to occur in the defect in the lysosomal enzyme glucosidase
- Pompes
  - Von Gierkes
  - Type Ia
  - All of the above
21. Which of the following are intermediates in the Krebs Cycle
- Citrate
  - Ketoglutarate
  - Oxaloacetate
  - Any of the above
22. Dextrins are highly branched homopolymers units, with not of the following linkages
- 1,4
  - 1,6
  - 1,3
  - NONE of the above
23. Polysaccharides containing more than one type of sugars are which of the following
- Glycosaminoglycans
  - Haemoglobin
  - DNA
  - All of the above
24. Which of the following is not a glycosaminoglycan(GAG)
- Hayluronic acid
  - Heparin
  - Chondatin sulphate
  - mitochondrion
25. Which of the following is a function of the Citric Acid cycle
- Provision of energy
  - provides intermediates for biosynthesis in other pathways
  - Regulates other pathway
  - All of the above
26. Which of the following is a lipid?
- Fats
  - Oils
  - Waxes

- D. All of the above
27. Which of the following is an inhibitor of the citric acid cycle
- A. High ATPs
  - B. Low ATPs
  - C. High AMPs
  - D. None of the above
28. Digestion of lipid foods start in which of the following
- A. Duodenum
  - B. Pancrease
  - C. Mouth
  - D. All of the above
29. Which of the following best describes the term Fatty Acid?
- A. Building block of protein
  - B. Amino acid
  - C. Building block of lipids
  - D. reducing sugar
30. What is a beta carbon in a Fatty Acid
- A. First carbon
  - B. Second carbon
  - C. Third carbon
  - D. Fourth carbon
31. All connective tissues has which of the following
- A. cells
  - B. fibers
  - C. extracellular matrices
  - D. ALL of the above
32. Which of the following is a function of connective tissues
- A. store energy
  - B. provides structural framework
  - C. Building blocks of lipids
  - D. None of the above
33. Gangliosides contain which of the following
- A. N-Acetyl neuraminic acid
  - B. lipoproteins
  - C. palmitate
  - D. inositol
34. What is the fate of the glycerol component of triacylglycerols
- A. Glycolysis
  - B. Citric acid cycle
  - C. Beta oxidation
  - D. None of the above
35. Cerebrosides have the following
- A. Phosphate
  - B. Sugar groups
  - C. No phosphate
  - D. Phospholipid
36. Which of the following substances emulsify lipids
- A. lipase

- B. Bile salts
  - C. Cholestykinin
  - D. Hydrochloric acid
37. Which one of the following genetic disorders is not as a result of abnormal accumulation of certain complex lipids
- A. Tay Sachs disease
  - B. Fabrys disease
  - C. Nieman picks disease
  - D. Von Gierkes disease
38. Which of the following proteins assist in transporting lipids to the liver
- A. Globulin
  - B. Albumin
  - C. Elastin
  - D. None of the above
39. Which of the following is involved in transporting long chain fatty acids to the mitochondria
- A. Acyly CoA transferase
  - B. Carnitine transferases
  - C. ATP
  - D. ALL of the above
40. Gluconeogenesis is NOT which of the following
- A. Formation of glucose from carbohydrates
  - B. Formation of glucose from lactate
  - C. Formation of glucose fom aminoacids
  - D. Formation of glucose from ketone bodies
41. Which of the following condtions leads to scurvy
- A. Vitamin C deficiency
  - B. Vitamin K deficiency
  - C. Vitamin D deficiency
  - D. All of the above
42. Which of the following enzymes are involved in the beta oxidation of fats
- A. Acyl-carboxylase
  - B. Amylase
  - C. Glycogen phosphorylase
  - D. Pepsinogen
43. Which of the following organs does the activity of the enzyme Glucokinase occur
- A. Kidney
  - B. Skeletal muscles
  - C. Liver
  - D. Brain
44. Which of the following hormones initiate lipolysis
- A. Nor epinephrine
  - B. Glucagon
  - C. Insulin
  - D. None of the above
45. The first step in the degradation of aminoacids is referrd to as
- A. Translation

- B. Transamination
  - C. Replication
  - D. None of the above
46. What is the basic principle in the use of enzymes in diagnosis
- A. Based in comparing changes in activity in serum and plasma
  - B. . Presence of intracellular enzymes in blood indicates tissue damage
  - C. Constant level of enzymes in blood indicates normal function
  - D. All of the above
47. Which of the following is a ketone body
- A .Acetone
  - B. Hydroxy butyrate
  - C. Acetoacetate
  - D. ALL of the above
48. Which of the following enzymes involved in degradation of aminoacids are markers of liver damage
- A. LDH
  - B. ALP
  - C. phosphatase
  - D. All of the above
49. Which of the following factors dictate to the choice of an Enzyme Test
- A. Enzyme distribution among tissues
  - B. Inactivation in blood stream
  - C. Tertiary structure
  - D. Active site
50. Which of the following Hormones initiate lipolysis
- A. Glucagon
  - B. Epinephrine
  - C. Insulin
  - D. All of the above
51. Pancreatic functions are determined by which of the following enzymes
- A. Amylase
  - B. Lipase
  - C. CCK
  - D. None of the above
52. Lipase activity in the serum is a measure exclusively for which diseases
- A. Pancrease
  - B. Kidney
  - C. Liver
  - D. Intestines
53. 5" nucleotidase activity is generally elevated in which type of diseases
- A. hepatobiliary
  - B. Salivary
  - C. Stomach
  - D. CancerS
54. Jaundice can be divided into which of the following
- A. Haemolytic

- B. Hepatocellular
  - C. Obstructive
  - D. All of the above
55. Which of the following enzymes are increased in cholestasis
- A. Alkaline phosphatase
  - B. Gamma Glutamyl transferase
  - C. 5" Nucleotidase
  - D. All of the above
56. Which of the following enzyme is increased in liver damage
- A. SGOT
  - B. LDH
  - C. IsoCDH
  - D. All of the above
57. Which of the following enzymes is a cancer marker?
- A. ALP
  - B. CK
  - C. CGT
  - D. LDH
58. A DEFECT IN THE urea cycle can lead to which of the following;
- A. Ammonia toxicity
  - B. Kidney failure
  - D. Raised PH level
  - C. ALL OF THE above
59. What are the clinical significance of transaminase enzymes
- A. Used to detect myocardial infarction
  - B. Used in cardiac ischemia
  - C. Used to assess liver function
  - D. NONE of the above
60. Which of the following is a step in the beta oxidation of fatty acids
- A. Hydration
  - B. Isomerism
  - C. Epimeration
  - D. ALL OF THE ABOVE