

**CHUKA**



**UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**EXAMINATION FOR THE AWARD OF DEGREE OF  
BACHELOR OF SCIENCE IN NURSING UPGRADING**

**NURU 119: MEDICAL BIOCHEMISTRY II**

**STREAMS: BSC (NURS)**

**TIME: 2 HOURS**

**DAY/DATE: TUESDAY 17/11/2020**

**11.30 AM – 1.30 PM**

---

**INSTRUCTIONS:**

- **All questions are compulsory. Ensure that all your answers are properly numbered.**
- **Part I: multiple Choice Questions (MCQ): Write the correct answer on the space provided in the answer booklet. Each MCQ is one mark.**
- **Part II: Short Answer Questions-Answer questions following each other on the answer booklet.**
- **Part III: Long Answer Questions: Answer each question on the answer booklet.**

**PART I: MCQ (20 MARKS)**

1. The degradation of amino acids can be classified into families, which are named after the end product of the degradative pathway. Which of the following is such an end product?

- A. Citrate
- B. Fumarate
- C. Fructose-6-phosphate
- D. Malate

2. The first step in the  $\beta$ -oxidation of fatty acyl CoA is catalyzed by

- A. Succinate dehydrogenase
- B. NADH dehydrogenase
- C. ATP synthase
- D. Acyl co-A dehydrogenase

3. Key regulatory enzyme of fatty acid synthesis is?

- A. Acetyl CoA synthetase
- B. Keto acyl synthetase

- C. Thioesterase
- D. Acetyl CoA carboxylase

4. In conversion of lactic acid to glucose, three reactions of glycolytic pathway are circumvented, which of the following enzymes do not participate?

- A. Pyruvate carboxylase
- B. Phosphoenolpyruvatecarboxykinase
- C. Pyruvate kinase
- D. Glucose-6-phosphatase

5. Which of the following enzyme is not involved in pentose phosphate pathway?

- A. Glyceraldehyde-3-P-dehydrogenase
- B. Glucose-6-P-dehydrogenase
- C. Transketolase
- D. Phosphogluconate dehydrogenase

6. Which of the following statements regarding TCA cycle is true?

- A. It is an anaerobic process
- B. It occurs in cytosol
- C. It is amphibolic in nature
- D. It generates 10 molecules of ATP per cycle

7. All of the following tissues are capable of using ketone bodies, except:

- A. Brain
- B. Renal cortex
- C. Red blood cells
- D. Cardiac muscle

8. During each cycle of  $\beta$ -oxidation of fatty acid, all the following compounds are generated, except:

- A. NADH
- B.  $H_2O$
- C.  $FAD.H_2$
- D. Acetyl-CoA

9.  $\beta$ -oxidation of odd-carbon fatty acid chain produces:

- A. Succinyl-CoA
- B. Propionyl-CoA
- C. acetyl-CoA
- D. Malonyl-CoA

10. During stages of starvation, blood levels of all the following would be expected to be elevated except:

- A. Epinephrine
- B. Glucagon
- C. Ketone bodies

D. Glycogen

11. Which of the following enzymes cannot fix ammonia into an organic molecule?
- Glutamine synthetase
  - Gutaminase
  - Glutamate dehydrogenase
  - Carbamoyl phosphate synthetase 1
12. Key regulatory enzyme of urea cycle is?
- Ornithine transcarbamoylase
  - Carbamoyl phosphate synthetase-I
  - Keto acyl synthetase
  - Arginase.
13. A 60 years-old man has been fasting for religious reason for several days. His brain has reduced its need for glucose by using which of the following substances as an alternate source of energy?
- Fatty acids
  - Acetyl CoA
  - Glycerol
  - $\beta$ -hydroxybutyrate
14. Pyridoxal phosphate, which is required for transamination, is also required for which of the following pathways?
- Glycolysis
  - Glycogenolysis
  - TCA cycle
  - Fatty acid oxidation
15. Glucagon and epinephrine stimulate glycogen breakdown to glucose 6-phosphate
- Directly by binding to glycogen phosphorylase
  - Indirectly by first stimulating adenylatecyclase to make cAMP
  - Only in the liver
  - Only in muscle cell
16. The main function of pentose phosphate pathway is to;
- Give the cell an alternate pathway should glycolysis fail
  - Supply pentose and NADPH
  - Supply energy
  - Provide mechanism for utilization of the carbon skeletons of excess amino acids
17. A 50-year-old male patient undergoing radiation therapy for prostate cancer develops severe pain in the metatarsal phalangeal joint of his right big toe. Monosodium urate crystals are detected by polarized light microscopy in fluid obtained from this joint by arthrocentesis. Uric

acid crystals are present in his urine. This patient's pain is directly caused by the overproduction of the end product of which of the following metabolic pathways?

- a) Purine degradation
- b) Pyrimidine degradation.
- c) De novo purine biosynthesis.
- d) Purine salvage.

18. A patient has large deposit of liver glycogen, which after an overnight fast had shorter than normal branches. This abnormality could be caused by a defective form of which of the following proteins?

- a) Amylo 1,6 glucosidase
- b) Amylo 4,6 transferase
- c) Glycogen phosphorylase
- d) Glycogenin

19. A person with phenylketonuria cannot convert

- a) phenylalanine to tyrosine
- b) phenylalanine to isoleucine
- c) phenylalanine to lysine
- d) phenol to ketones

20. Medium-chain fatty acids are given because they:

- a) stimulates VLDL production by the liver.
- b) enter directly into the portal blood and can be metabolized by the liver.
- c) are activators of lipoprotein lipase.
- d) are more efficiently packed into serum lipoproteins.

**PART II: SHORT ANSWER QUESTIONS (40 MARKS)**

1. Describe degradative pathway of branched chain amino acids. (8 marks)
2. Define ketogenesis and explain its functions. (5 marks)
3. What is the biochemical basis of type 1 glycogen storage disease? (4 marks)
4. Define gluconeogenesis. Name key enzymes of gluconeogenesis. (4 marks)
5. Describe the major types of jaundice. (8 marks)
6. List six human genetic disorders associated with defective amino acid catabolism. (6 marks)
7. Outline clinical significance of purine metabolism. (5 marks)

**PART III: LONG ANSWER QUESTIONS (40 MARKS)**

1. Discuss medical conditions that increase risk of severe Covid-19. (20 marks)
2. Describe the reactions in citric acid cycle and explain why it is amphibolic. (20 marks)