



**AMREF INTERNATIONAL UNIVERSITY  
SCHOOL OF MEDICAL SCIENCES  
DEPARTMENT OF PHYSIOTHERAPY  
BACHELOR OF SCIENCE IN PHYSIOTHERAPY (DIRECT ENTRY)  
SPECIAL/SUPLMENTARY 2024 EXAMINATIONS**

**COURSE: PHT 128: BIOCHEMISTRY**

**DATE:**

Duration: 2 HOURS

Start:

Finish:

**INSTRUCTIONS**

1. This exam is out of **70 Marks**
2. This Examination comprises **THREE** Sections. Section I: Multiple Choice Questions Section II: Short Answer Questions and Section III: Long Answer Questions
3. Answer **ALL** Questions.

**SECTION I: MULTIPLE CHOICE QUESTIONS (20 MARKS)**

1). Malonate can depress operation of the tricarboxylic acid cycle by:

- A). Competitively inhibiting succinate dehydrogenase
- B). Complexing with an essential metal ion factor
- C). Complexing with acetyl-CoA
- D). Favoring fatty acid biosynthesis

2. Which of the following molecules is capable of inhibiting pyruvate dehydrogenase, citrate synthase, isocitrate dehydrogenase, and  $\alpha$ -ketoglutarate dehydrogenase?

- A). Succinyl CoA
- B). Acetyl CoA
- C). ATP
- D). NADH

3. A biological redox reaction always involves:

- A). A loss of electrons.
- B). A gain of electrons.
- C). A reducing agent.
- D). All of the above.

4. Schizophrenia is associated with altered

- A) Dopamine metabolism.
- B) Phenylalanine metabolism.
- C) Tyrosine metabolism.
- D) Epinephrine metabolism.

5. Movement of membrane lipids from one side to another side of membrane is called as

- A) Lateral motion
- B) Transverse motion
- C) Horizontal motion
- D) Parallel motion

6. Breathing heavily after running a race is the body's way of:
- A). Making more citric acid.
  - B). Repaying an oxygen debt.
  - C). Restarting glycolysis.
  - D). Recharging the electron transport chain.
7. Creatine formation require
- A). Glycine, Arginine
  - B). Arginine, Methionine
  - C). Glycine, Arginine, Methionine
  - D). Methionine, Glycine
8. Transfer of fatty acids from the cytoplasm to the intra-mitochondrial space involves:
- A). Choline
  - B). 3-hydroxy-4-trimethylamine-lysine
  - C). Carnitine
  - D). Phosphoarginine
9. The two sides of cell membrane are
- A) Identical
  - B) Rich in carbohydrates
  - C) Not identical
  - D) Rich in cholesterol
10. Ubiquitin is a protein required for
- A). Protein degradation
  - B). Amino acid degradation
  - C). Glycoprotein degradation
  - D). None of the above

11. In patients with Lesch Nyhan Syndrome, purine nucleotides are overproduced and over excreted. The hypoxanthine analogue Allopurinol, which effectively treats gout, has no effect on the severe neurological symptoms of Lesch-Nyhan patients because it does not

- (A) Decrease de novo purine synthesis
- (B) Decrease denovo pyrimidine bio synthesis
- (C) Decrease urate synthesis
- (D) Increase PRPP levels (Phosphoribosyl pyrophosphate)

12. All the following statements are true for fat soluble vitamins. Except.

- (A) They require bile salts for absorption.
- (B) They exist in provitamin form.
- (C) Liver is their storage site.
- (D) Soluble in organic solvents.

12. Which of the following is a required substrate for purine biosynthesis?

- (A) 5-methyl thymidine
- (B) Ara -C
- (C) Ribose phosphate
- (D) PRPP

13. A 7-year old boy suffers from mental retardation and self-mutilation and has an increased levels of serum uric acid. These symptoms are characteristic of Lesch Nyhan syndrome, which is due to defective-

- (A) Salvage pathway for pyrimidine biosynthesis
- (B) Denovo synthesis of pyrimidines
- (C) Xanthine oxidase
- (D) HGPRT (Hypoxanthine Guanine Phospho Ribosyl Transferase)

14. Which is the rate limiting step of pyrimidine synthesis that exhibits allosteric inhibition by cytidine triphosphate?

- (A) Aspartate transcarbamoylase
- (B) Hypoxanthine Guanine phosphoribosyl Transferase
- (C) Thymidylate synthase
- (D) Xanthine oxidase

15. Which out of the following conditions is associated with hyperuricemia?

- (A) Lesch Nyhan syndrome
- (B) Adenosine deaminase deficiency
- (C) Over activity of PRPP synthetase
- (D) Over activity of amido transferase

16. The conversion of Inosine mono phosphate-

- (A) To Adenosine mono phosphate (AMP) is inhibited by Guanosine mono phosphate (GMP)
- (B) To AMP requires uridine mono phosphate (UMP)
- (C) To GMP requires GMP kinase
- (D) To GMP requires Glutamine

17. Which of the following contributes nitrogen atoms to both purine and pyrimidine rings?

- (A) Aspartate
- (B) Carbamoyl phosphate
- (C) Carbon dioxide
- (D) Glutamate

18. Which of the following is an important precursor in purine pathway?

- (A) Glycine
- (B) Aspartate
- (C) Glutamine
- (D) Leucine

19. In the first committed step of pyrimidine biosynthesis, the reaction is catalyzed by-----

- (A) Adenylate kinase
- (B) Aspartate transcarbamoylase
- (C) Dihydroorotase
- (D) Cytidylate synthase

20. Which of the following is rich vit. E source

- (A) Vegetable oils.
- (B) Fruits.
- (C) Vegetables.
- (D) Meat

**SECTION II: SHORT ASSAY QUESTIONS (30 MARKS)**

21.a) What is an eicosanoid? (2 Marks)

b) Outline the functions of the following;

i) Thromboxane (TXA<sub>2</sub>) (3 Marks)

ii) Prostaglandins (5 Mark)

22. Briefly explain mechanisms of ammonia toxicity. (5 Marks)

23. With reference to relevant structure(s), distinguish the following.

i) Maltose and Sucrose (4 Marks)

ii) Nucleotide and Nucleoside (3 Marks)

24. What is the pH of solution whose OH<sup>-</sup> ions concentration is  $2.0 \times 10^{-3}$  molar. (5 Marks)

25. Describe the active site of enzymes. (3 Marks)

**SECTION C: LONG ASSAY QUESTIONS (20 MARKS)**

**INSTRUCTIONS: Answer ONLY ONE Question**

26. (a). Describe in details the enzymatic reactions of TCA cycle. (14 Marks)

(b). Calculate the total amount of ATP generated under normal conditions from oxidation of glucose through glycolysis up to the end of TCA cycle. Show how you arrive at your answer.

(6 Marks)

27. Discuss enzymatic reactions and disorders associated with urea cycle. (20 Marks)