(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS 2021/2022

ACADEMIC YEAR

FIRST YEAR FIRST TRIMESTER

MAIN EXAMINATION

FOR BACHELOR OF SCIENCE IN NURSING DEGREE

COURSE CODE: NUR 125

COURSE TITLE: MEDICAL BIOCHEMISTRY II

DATE: 28/04/2022 **TIME: 09.00AM**

INSTRUCTIONS TO CANDIDATES

Answer ALL Section one (1) MULTIPLE CHOICE QUESTIONS and ALL Section two (2) SHORT ANSWER QUESTIONS and any one (1) section THREE (3) LONG ANSWER QUESTION.

TIME: 3 Hours

This paper consists of 9 printed pages. Please Turn Over

KIBU observes ZERO tolerance to examination cheating

SECTION A: MULTIPLE CHOICE QUESTIONS **50 Marks**

INSTRUCTION: Answer ALL questions

1. The degradative processes concerned with the breakdown of complex molecules to simple ones are known as ___.
   A. Catabolism
   B. Anabolism
   C. Amphibolism
   D. Metabolism

2. The biosynthetic reactions involving the formation of complex molecules from simple processes are known as ___.
   A. Metabolism
   B. Amphibolism
   C. Anabolism
   D. Catabolism

3. Glycolysis is also known as___.
   A. Citric acid cycle
   B. Tricarboxylic acid cycle
   C. Krebs cycle
   D. Embden-Meyerhof pathway

4. Formation of glycogen from glucose is known as___.
   A. Glycolysis
   B. Gluconeogenesis
   C. Glycogenesis
   D. Glycogenolysis

5. The process of breakdown of glycogen to glucose is known as___.
   A. Krebs cycle
   B. Glycogenolysis
   C. Genetics
   D. Glycolysis

6. Hake Jose monophosphate pathway is also called as ___.
   A. Monophosphate pathway
   B. Pentosephosphate pathway
   C. Hexosephosphate pathway
   D. Ribophosphate pathway

7. Citric acid cycle essentially involves the oxidation of acetyl CoA to CO_2 and ___.
   A. H_2O
   B. 0_2
   C. H_2O_2
   D. S_2

8. Which of the following enzyme is not involved in galactose metabolism?

A. Glucokinase
B. Galactokinase
C. Galactose-1-Phosphate Uridyl transferase
D. UDP-Galactose 4- epimerase

9. Which of the following enzyme is defective in galactosemia- a fatal genetic disorder in infants?

A. Glucokinase
B. Galactokinase
C. Galactose-1-Phosphate Uridyl transferase
D. UDP-Galactose 4- epimerase

10. In the liver, the accumulation of which of the following metabolite attenuates the inhibition of ATP on phosphofructokinase?

A. Glucose-6-Phosphate
B. Citrate
C. Fructose-1, 6-Bisphosphate
D. Fructose-2, 6-Bisphosphate

11. One of the following statement about Phosphofructokinase-2 (PFK-2) is false
A. PFK-2 is a bifunctional enzyme having a kinase domain, phosphatase domain, and a regulatory domain
B. Activated protein kinase A phosphorylates PFK-2 and activates phosphatase domain
C. PFK-2 catalyzes the conversion of fructose-6-phosphate to fructose 2-6 bisphosphate
D. PFK-2 phosphatase activity is activated by the insulin signaling pathway.

12. One of the following hormone decreases blood glucose and increases the uptake of glucose in various tissues like skeletal muscle, adipose tissues
A. Glucagon
B. Epinephrine
C. Cortisol
D. Insulin

13. One of the following statement is true
A. Glycolysis occurs only in mammalian cells
B. Glycolysis occurs in mitochondria
C. Glycolysis occurs in the presence and absence of oxygen
D. Glycolysis occurs when ATP concentration is high.

14. What enzyme is the rate-limiting step in glycolysis?
A. Hexokinase
B. Phosphohexose isomerase
C. Glyceraldehyde-3-phosphate dehydrogenase
D. Enolase

15. The net gain of ATP during the conversion of glucose to pyruvate is:

A. 1 ATP
B. 2 ATP
C. 1 ATP +1 GTP
D. 4 ATP

16. During the conversion of glucose to pyruvate, two NADH molecules are generated. Which of the following steps generates NADH?
A. Conversion of fructose-6-phosphate to fructose-1-6-bisphosphate
B. Conversion of glyceraldehydes-3-phosphate to 1-3-bisphosphoglycerate
C. Conversion of 3-phosphoglycerate to 2-phosphoglycerate
D. Conversion of phosphoenolpyruvate to pyruvate

17. What is the committed step in glycolysis?
A. Conversion of glucose to glucose-6-phosphate
B. Conversion of fructose-6-phosphate to fructose-1, 6-bisphosphate
C. Conversion of glyceraldehydes-3-phosphate to 1-3-bisphosphoglycerate
D. Conversion of 3-phosphoglycerate to 2-phosphoglycerate

18. Glycolysis consists of three irreversible steps.
Which of the following enzyme-catalyzed reaction are not irreversible steps in glycolysis?
A. Hexokinase
B. Phosphofructokinase
C. Glyceraldehyde-3-phosphate kinase
D. Pyruvate kinase

19. The following are the negative regulators of phosphofructokinase except
A. ATP
B. AMP
C. Citrate
D. pH

20. Which of the following step is inhibited by sodium fluoride?
A. Glyceraldehyde-3-phosphate dehydrogenase
B. 3-phosphoglycerate mutase
C. Enolase
D. AMP

21. Which of the following lipids act as lungs surfactants?
A. Phosphatidylcholine
B. Phosphatidylethanolamine
C. Ceramide
D. Phosphatidylinositol

22. Identify the simple lipid from the following?
A. Lecithin
B. Fatty acid

C. Triacylglycerol
D. Steroids

23. All of the following are complex lipids, except?
A. Phosphatidic acid
B. Cerebroside
C. Cardiolipin
D. Cholesterol

24. Which of the following is an essential fatty acid?
A. Linolenic acid
B. Arachidonic acid
C. Oleic acid
D. Palmitic acid

25. Bile acid is derived from:
A. Cholesterol
B. Amino acids
C. Fatty acids
D. Bilirubin

26. Which of the following lipid is mostly present in mitochondrial membranes?
A. Lecithin
B. Cephalin
C. Cardiolipin
D. Ceramide

27. Insulin enhances the uptake of triacylglycerols in adipose tissues.
Which of the following enzyme is activated that facilitates the uptake?
A. Hormone-sensitive lipase
B. Lipoprotein lipase
C. LCAT
D. Apo C-II

28. Familial hypercholesterolemia is a genetic disorder of cholesterol metabolism. The defect lies in the.....
A. Transport of cholesterol from extrahepatic tissue to the liver
B. Impairment of cholesterol degradative pathway
C. Impairment of uptake of cholesterol by tissues
D. Impairment of HDL metabolism due to deficiency of Apo-A

29. Which of the following inhibits acetyl CoA carboxylase- a rate-limiting enzyme of fatty metabolism?
A. Citrate
B. ATP
C. Malonyl CoA

D. Acyl CoA

30. Acetyl CoA serves as the precursor for the synthesis of cholesterol, and the biosynthesis of cholesterol is tightly regulated. Which of the following step is a regulatory step of cholesterol biosynthesis?
A. Formation 3-hydroxy-3-methylglutaryl COA
B. Formation of Mevalonate
C. Formation of Isoprenoid Unit
D. Formation of Lansterol

31. Which membrane fatty acids are precursors for eicosanoids?
A. C20 and C22 saturated fatty acids
B. C18 and C22 polyunsaturated fatty acids
C. C20 and C22 monounsaturated fatty acids
D. C20 and C22 polyunsaturated fatty acids

32. De novo fatty acid synthesis usually signifies which of the following?
A. An excess of fat intake
B. A depletion of energy yielding substrates
C. Only occurs with prolonged fasting
D. An excess of energy yielding substrates

33. Which of the following statements is incorrect regarding fatty acid ß-oxidation?
A. The major site of fatty acid ß-oxidation is the peroxisomes, the mitochondria also contain enzymes for this pathway
B. Within the liver peroxisomes serve to oxidise very long chain fatty acids to medium chain products
C. The rate of b-oxidation is regulated by the availability of fatty acids and the rate of utilisation of b-oxidation products
D. Peroxisomes are the site for the degradation of xenobiotics and eicosanoids

34. Ketone bodies are by products of metabolism of_____?
A. Protein
B. Carbohydrate
C. Fat
D. All of the above

35. The product of oxidation of odd chain fatty acids is_____?
A. Malonyl CoA
B. Aceto acetyl CoA
C. Propionyl CoA
D. Fumaryl CoA

36. Adipose tissue releases free fatty acids in the_____?
A. Fasting state
B. Active state

C. Resting state
D. All of the above

37. The main pathway for De – Novo synthesis of fatty acids occurs in_____?
A. Nucleus
B. Mitochondria
C. Cytosol
D. None of the above

38. Beta-oxidation of fatty acids occurs in
A. Peroxisome
B. Peroxisome and Mitochondria
C. Mitochondria
D. Peroxisome, Mitochindria and ER
Protein Metabolism

39. In deamination, the amino acid is converted into
A. Aldol acid
B. Keto acid
C. Hydrochloric acid
D. Carboxylic acid

40. The process of breakdown of amino acids to keto acids is called
A. Cisamination
B. Amination
C. Transamination
D. Racemization

41. Purines and Pyrimidines are the nitrogen bases present on the nucleotides. Which of the following is a purine base?
A. Adenosine
B. Cytosine
C. Thymine
D. Uracil

42. Nucleotides are:
A. Purine bases
B. Nitrogen bases+ Pentose Sugar
C. Nitrogen bases + Pentose sugar + Phosphate
D. None of the above

43. Which of the following is not the precursor for the denovo purine biosynthesis?
A. Aspartic Acid
B. Glycine
C. Glutamine
D. Arginine

44. Which of the following serves as the cofactor for the denovo synthesis of purine metabolism?
A. Thiamine
B. Biotin
C. Folate
D. Flavin

45. What is an activator of the enzyme "Glutamine: Phosphoribosylpyrophosphate amidotransferase" a committed step of de novo biosynthesis of purines?
A. Adenosine Monophosphate
B. Guanosine Monophosphate
C. Inosine Monophosphate
D. Phosphoribosyl Pyrophosphate

46. Which of the following is the correct statement regarding Sulfonamides?
A. Structural analogs of PABA that competitively inhibit bacterial synthesis of folic acid
B. Structural analogs of PABA that competitively inhibit the human synthesis of folic acid
C. Structural analogs of PABA that competitively inhibit the bacterial and human synthesis of folic acid
D. None of the above

47. Trimethoprim is a potent antibacterial compound that selectively inhibits bacterial.....
A. Formyltransferase
B. PRPP synthetase
C. Dihydrofolate reductase
D. None of the above

48. Which of the following is the coenzyme for the synthesis of deoxyribonucleotides catalyzed by an enzyme ribonucleotide reductase?
A. Glutathione
B. Thioredoxin
C. NADPH
D. FADH

49. Severe combined immunodeficiency disease is caused by the deficiency of the following enzymes?
A. AMP deaminase
B. Adenosine deaminase
C. PRPP synthetase
D. None of the above

50. Which of the following cofactor is used during the conversion of uracil to thymine?
A. S-Adenosyl Methionine
B. Tetrahydrofolate
C. Tetrahydrobiopterin

D. Biotin

SECTION B: SHORT ANSWER QUESTIONS (SAQS) 30 Marks
INSTRUCTION: Answer ALL questions

1. State the deficient enzyme and any three symptoms of Von Gierke's disease (5mks)
2. Discuss the similarities and differences between pyruvate dehydrogenase complex and α-ketoglutarate dehydrogenase complex (5mks)
3. Outline the oxidative reactions of the hexose monophosphate shunt (HMP-shunt) (5mks).
4. Name the 4 amino acids whose major pathways of their metabolism does not involve transamination (5mks)
5. Briefly discuss clinical aspects of galactose metabolism (5mks)
6. Outline the significance of metabolism in living organisms (5mks)

SECTION C: LONG ANSWER QUESTIONS (LAQS) **20 Marks**
INSTRUCTION: Answer any ONE question

1. Discuss the citric acid cycle (20mks)
2. Describe
   (a) How fatty acids are transported from cytosol to the matrix of the mitochondrion (10mks)
   (b) β-oxidation of fatty acids (10mks)