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MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR

FIRST YEAR TRIMESTER TWOFOR THE DEGREE OFBACHEL OR OF SCIENCE IN NURSING (ODEL)
MAIN EXAM

COURSE CODE: NCD 124

COURSE TITLE: CLINICAL BIOCHEMISTRY 2

DATE: 20/04/2022 TIME: 11:30 AM-2:30PM

INSTRUCTIONS TO CANDIDATES

TIME: 3 Hours

MMUST observes ZERO tolerance to examination cheating
Please turn over

PART A-MULTIPLE CHOICE QUASTIONS MCQ

1. The carbohydrate mannose is not present in the standard glycolytic pathway. It can, however, enter glycolysis by first being converted into another sugar. Which of the following choices represents the point at which mannose first enters the glycolytic pathway?

a) Glucose-6-phosphate
b) Glucose
c) Fuctose-6-phosphate
d) Fuctose-1,6-bisphosphate

2. What does it mean to say that glycolysis has an energy investment phase?

a) ATP must be used in order to create the NADH in glycolysis
b) There is a net loss of ATP in glycolysis
c) ATP must be used in order to prepare the glucose molecule to be split
d) ATP must be used in order to move the glucose into the cytosol

3. In what cellular compartment does the process of glycolysis occur?

a) Endoplasmic reticulum
b) Mitochondrial outer membrane
c) Cytosol
d) Mitochondrial inner membrane
e) Nucleus

4. Glycolysis converts molecules of glucose into pyruvate. Glycolysis consists of two phases: the preparatory phase (which consumes ATP) and the pay-off phase (which produces ATP). Which of these correctly indicates the number of ATPs consumed in the preparatory phase, and the number of ATPs generated in the pay-off phase of anaerobic glycolysis.

a) 2 ATP consumed, 2 ATP produced
b) 6 ATP consumed, 2 ATP produced
c) 2 ATP consumed, 4 ATP produced
d) 4 ATP consumed, 2 ATP produced

5. Pyruvate must be oxidized into acetyl-CoA in order to enter the citric acid cycle. Which of the following answers contains the inputs required for this process per one molecule of pyruvate?

a) ATP, NADH
b) ATP, NAD+
c) ADP, FADH
d) NAD+, coenzyme A

6. How many molecules of pyruvate are produced from one molecule of glucose during glycolysis?

a) 4

b) 6
c) 3
d) 2

7. What enzyme converts glyceraldehyde-3-phosphate to 1, 3-bisphosphoglyceric acid during glycolysis?

a) Phophoglycerate kinase
b) Glyceraldehyde-3-phosphate dehydrogenase
c) Pyruvate kinase
d) Enolase

8. Alcoholics often present with a deficiency in vitamin B1 (thiamine). What can you conclude about an alcoholic with thiamine deficiency?

I. He/she will not produce any pyruvate and NADH
II. There will be a buildup of lactic acid
III. He/she will not produce any acetyl-CoA from the breakdown of carbohydrates

a) III only
b) II and III
c) I and III
d) I only

9. Which of the following is not created in the Kreb's cycle?

a) $FADH_2$
b) NADH
c) Acetyl CoA
d) ATP

10. Each of the following enzymes is utilized in the citric acid cycle, except _____.

a) Phosphoglycerate kinase
b) Aconitase
c) Malate dehydrogenase
d) Citrate synthase

11. In what organ does gluconeogenesis primarily occur in vertebrates?

a) Liver
b) Brain
c) Lungs
d) Skin

12. Pyruvate from glycolysis must be converted to what before starting the Krebs cycle?

a) Isocitrate
b) Glucose
c) Carbon dioxide
d) Acetyl-CoA

13. How many total molecules of NADH are produced from 2 glucose molecules during cellular respiration?

a) 20
b) 16
c) 10
d) 15

14. Which of the following is true regarding the initial reaction of the Krebs cycle?

a) Two-carbon acetyl-CoA and four-carbon oxaloacetate combine to form a six-carbon citrate molecule
b) Two-carbon oxaloacetate and four-carbon acetyl-CoA to form a six-carbon malate molecule
c) Two-carbon acetyl-CoA and four-carbon oxaloacetate combine to form a six-carbon malate molecule
d) Two-carbon oxaloacetate and four-carbon acetyl-CoA combine to form a six-carbon citrate molecule

15. Which molecule is regenerated by the Krebs cycle in order to accept the next acetyl-CoA?

a) Citrate
b) Oxaloacetate
c) Succinate
d) Alpha-ketoglutarate

16. Which of the following is true regarding the final electron acceptor in the electron transport chain?

a) It only picks up electrons
b) It contributes to the production of energy
c) It picks up electron and protons
d) It is a byproduct of anaerobic respiration

17. Which of the following molecule(s) undergoes reduction during the electron transport chain?

a) None of these are reduced
b) Both of these are reduced
c) Oxygen
d) NADH

18. Oligomycin is an inhibitor of ATP synthase. Which of the following will you observe in the cells of a patient taking oligomycin?

I. There will be a higher concentration of protons in the intermembrane space
II. Proton pump will no longer be functional
III. ATP production will be decreased

a) I and II
b) III only
c) I and III
d) I, II, and III

19. Which of the following cellular processes is defined as a catabolic reaction?

a) Gluconeogenesis
b) Gylcolysis
c) Protein synthesis
d) Glycogenesis

20. Which enzyme would be inhibited in the body following a carbohydrate-heavy meal?

a) Glycogen synthase
b) PFK-1
c) Fructose-1,6-bisphosphatase
d) Glucokinase

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PART B SHORT ANSWER QUASTIONS 40MARKS

1. For a given molecule of glucose, Krebs cycle produces _____ the amount of NADH and _____ amount of ATP as glycolysis. 4MKS
2. _____ is an enzyme used to help break down glycogen. The end product is _____.4MKS
3. Krebs cycle occurs in the _____ and the electron transport chain occurs in the _____.4MKS
4. Anaerobic respiration occurs in the _____ and aerobic respiration occurs in the _____.4MKS
5. Anaerobic metabolism occurs in the _____; fermentation occurs in the _____.4MKS
6. State the difference between metabolism, catabolism, and anabolism.6MKS
7. Define glycemic index? 2mks
8. State at least four organs where glucose metabolism takes place?4mks
9. An oxidative pathway of glucose-6-phosphate is also known as...2mks

PART C LONG ANSWER QUASTIONS 40MARKS

1. All living cells are capable of metabolism and m any metabolic pathways are amphibolic.

a) Describe the many different ways in which cells regulate their metabolic pathways to maximize efficiency.(10marks)
b) Discuss the primary significance of the pentose phosphate pathway?(10marks)

2. A 47-year-old south Asian man was referred to our hospital from a detention center for generalized weakness and severe hypokalemia (1.9 mmol/L). The patient noted that his symptom of muscle weakness had been present for several weeks. He had a 6-year history of hypertension managed with lisinopril and amlodipine. Spironolactone?

a) Describe the effects of change in metabolic activity level on the cardiovascular, respiratory, and digestive systems. (15marks)
b) what is step 8 of the TCA cycle (5marks)