NAME _____

STUDENT NO. _____

BIOCHEMISTRY 2EE3 Dr. B. S. Zhorov

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  THIS IS TEST VERSION 2. Error in marking the test version is unacceptable.
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- Pay particular attention to the Marking Directions on the form.
- Begin answering questions using the first set of circles, marked "1".
- Each question is worth one mark for a correct answer and a zero marks for an incorrect answer. An unmarked question is considered an incorrect answer.

Questions

1. In the REDOX reactions involving nicotinamide dinucleotide, the mechanism of the electrons transfer is:

   a) direct transfer
   b) transfer in the form of hydrogen atoms
   c) transfer in the form of hydride ion
   d) direct recombination with oxygen

2. X. Reaction: **ATP + glucose ↔ ADP + glucose-6-P** is exergonic.
Y. Reaction: **Phosphoenolpyruvate + ADP ↔ Pyruvate + ATP** is endergonic.

a) Only X is correct
b) Only Y is correct
c) Both X and Y are correct
d) Neither X nor Y is correct

3. What is the reason of the cardiomyocyte death in the absence of O_2?

a) Loss of glucose
b) Accumulation of protons
c) Inability to sustain proper concentration of ions
d) Accumulation of CO_2

4. Which of the following is the highest-energy compound?

a) ATP
b) Glycerol-3-phosphate
c) Phosphoenolpyruvate
d) Phosphocreatine

5. Aconitase catalyzes formation of:

a) oxaloacetate
b) malate
c) isocitrate
d) alpha-ketoglutarate

6. Which experimental observation is explained by the chemiosmotic theory?

a) Mitochondrion contains its own DNA
b) The inner mitochondrial membrane is permeable to CO_2
c) Compounds that increase the permeability of the inner mitochondrial membrane to H^+ inhibit ATP synthesis
d) The inner mitochondrial membrane is permeable to H_2O

7. The heart attack is diagnosed by the high blood concentration of:

a) M-type lactate dehydrogenase
b) Pyruvate dehydrogenase
c) Aldolase
d) None of the above

8. Glucose-6-phosphate is involved in:

a) gluconeogenesis
b) pentose phosphate pathway
c) glycogen synthesis
d) all of the above

9. Which of the following compounds is at a higher level of oxidation than CH_3CHO ?

a) CH_3CH_2OH
b) CH_3CH_3
c) $CH_2=CH_2$
d) CH_3CO_2H

10. What is NOT true about nicotinamide dinucleotide:

a) It is a coenzyme
b) It reversibly binds to dehydrogenases
c) It is a water-soluble molecule
d) It exists in three REDOX states

11. Which equation represents reduction of acetaldehyde?

a) $NAD^+ + CH_3CHO \leftrightarrow NADH^+ + CH_3CH_2OH$
b) $NADH + H^+ + CH_3CHO \leftrightarrow NAD^+ + CH_3CH_2OH$
c) $NADH + H^+ + CH_3CH_2OH \leftrightarrow NAD^+ + CH_3CHO$
d) $NAD^+ + CH_3CH_2OH \leftrightarrow NADH + CH_3CHO$

12. Which cells use glucose as the only source of energy?

a) Neurons
b) Erythrocytes
c) Lipocytes
d) Myocytes

13. X. Hexokinase catalyzes phosphorylation of glucose.
Y. Phosphoglycerate kinase is involved in the glycolysis.

a) Only X is correct
b) Only Y is correct
c) Both X and Y are correct
d) Neither X nor Y is correct

14. The anaerobic glycolysis produces:

a) 2 lactate + 2ATP + $2H_2O$ + $2H^+$
b) 2 lactate + $2NADH^+$ + 2ATP + $2H_2O$ + $2H^+$
c) 2 lactate + 2ATP + $2H_2O$
d) 2 lactate + 4ATP + $2H_2O$ + $2H^+$

15. X. Glycogen contains many reducing ends.
Y. Glycogen phosphorylase can release monomers, which are more than four units away from a branch point.

a) Only X is correct
b) Only Y is correct
c) Both X and Y are correct
d) Neither X nor Y is correct

16. X. Dihydrolipoyl transacetylase transfers the acetyl group to CoA.
Y. Pyruvate decarboxylation is catalyzed by pyruvate dehydrogenase.

a) Only X is correct
b) Only Y is correct
c) Both X and Y are correct
d) Neither X nor Y is correct

17. What of the following is NOT a component of the electron transport chain?

a) Cytochrome *c*
b) Succinate dehydrogenase
c) Cytochrome P450
d) Coenzyme Q

18. In the pyruvate dehydrogenase multienzyme complex, oxidation of dihydrolipoyl dehydrogenase is coupled to:

a) Reduction of NAD^+
b) Reduction of hydroxyethyl-TPP
c) Oxidation of FADH
d) Acetyl transfer to CoA

19. X. Isocitrate dehydrogenase canalizes synthesis of α-ketoglutarate.
Y. Succinyl-CoA synthetase canalizes synthesis of ATP.

a) Only X is correct
b) Only Y is correct
c) Both X and Y are correct
d) Neither X nor Y is correct

20. Name the redox center(s) in the electron transport chain.

a) CoA
b) Flavin mononucleotide
c) ATP
d) All of the above

21. The amount of free energy released upon oxidation of NADH is:

a) less than 100 kJ/mol
b) between 100 and 150 kJ/mol
c) between 150 and 200 kJ/mol
d) more than 200 kJ/mol

22. X. Thermogenin uncouples the proton transport and oxidative phosphorylation.
Y. Thermogenin is blocked by ATP.

a) Only X is correct
b) Only Y is correct
c) Both X and Y are correct
d) Neither X nor Y is correct

23. Which compound(s) permeate the mitochondrial matrix via the glycerophosphate shuttle?

a) Glycerol
b) Inorganic phosphate (P_i)
c) Both glycerol and P_i
d) Neither glycerol nor P_i

24. Which complex in the electron transport chain contains cytochrome *a*?

a) Complex I
b) Complex II
c) Complex III
d) Complex IV

25. X. The exergonic oxidation of NADH in the electron transport chain drives the endergonic relocation of 10 protons from the intermembrane space to the matrix.
Y. The proton gradient across the inner membrane drives the exergonic synthesis of ATP.

a) Only X is correct
b) Only Y is correct
c) Both X and Y are correct
d) Neither X nor Y is correct

THE END