KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2018

Marks Scored:

Level : B. Tech.
Year : II

Course : BIOT 203
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date FEB 2 7 2018

SECTION "A"
[20 Q. × 1 =20 marks]

Tick [√] the correct answer

1. Which of the following is an organelle with protein-DNA-RNA complex used in pre-ribosome production?
   a. Glycosome b. Nucleolus c. Glyoxysome d. Proteosome

2. Which of the elements was NOT present in the spark chamber mimicking early atmosphere of the earth?
   a. NH_3 b. CH_4 c. H_20 d. CO_2

3. In biochemistry, a kinase catalyzes phosphorylation, where the substrate gains a phosphate group from high-energy ATP molecule. Kinase is thus a
   a. Lyase b. Isomerase c. Transferase d. Hydrolase

4. Which of the following statements about Michaelis-Menten kinetics is correct?
   a. The Michaelis constant is defined as the concentration of the substrate required for the reaction to reach maximum velocity
   b. Michaelis constant is defined as the dissociation constant of the enzyme-substrate complex
   c. Michaelis constant is expressed in terms of reaction velocity
   d. Michaelis constant is the measure of the affinity the enzyme has for its substrate

5. Which of the following statements concerning the peptide shown below is correct?
   Gly-Cys-Glu-Ser-Asp-Arg-Cys
   a. The peptide contains glutamine.
   b. The peptide contains a side chain with a secondary amino group.
   c. The peptide contains a majority of amino acids with side chains that would be positively charged at pH 7.
   d. The peptide is able to form an internal disulphide bond.

6. Which one of the following statements is correct?
   a. The alpha helix can be composed of more than one polypeptide chain.
   b. Beta sheets exist only in the antiparallel form.
   c. Beta-bends often contain proline.
   d. Domains are a type of secondary structure.

7. The steps of glycolysis between glyceraldehyde 3-phosphate and 3-phosphoglycerate involve all of the following except:
   a. ATP synthesis
   b. Catalysis by phosphoglycerate kinase
   c. Oxidation of NADH to NAD+
   d. The formation of 1,3-bisphosphoglycerate

8. Xylulose 5-phosphate can be formed from ribulose 5-phosphate by the action of?
   a. Glucose-6-P dehydrogenase
   b. Transketolase
   c. Transaldolase
   d. Phosphopentose isomerase

9. Which statement BEST describes the fate of Propionyl-CoA in mammalian system?
   a. It is metabolized via the action sequence that involves Vitamin B12 and biotin.
   b. It is converted to acetyl CoA.
   c. It condenses with acetyl CoA to form 5 carbon precursor of TCA cycle.
   d. It is oxidized to malonate and CoA.

10. In humans cholesterol is generally transported as:
   a. bile acids
   b. steroid hormones
   c. ergosterol
   d. cholesteryl ester

11. The breakdown of one molecule of a C16 fully saturated fatty acid by beta oxidation leads to the formation of
   a. 8 $FADH_2$, 8 NADH and 8 acetyl CoA molecules
   b. 7 $FADH_2$, 7 NADH and 7 acetyl CoA molecules
   c. 7 $FADH_2$, 8 NADH and 8 acetyl CoA molecules
   d. 7 $FADH_2$, 7 NADH and 8 acetyl CoA molecules

12. The following is the sum of three steps in the citric acid cycle.
$A + B + FAD + H_2O \rightarrow C + FADH_2 + NADH$
Choose the lettered answer that corresponds to the missing "A", "B", and "C".

	Reactant A	Reactant B	Reactant C
a.	Succinyl CoA	GDP	Succinate
b.	Malate	NAD+	Oxaloacetate
c.	Fumarate	NAD+	Oxaloacetate
d.	Succinate	NAD+	Oxaloacetate

13. Which of the statements is incorrect?
   a. Menaquinone is found in bacterial electron transport.
   b. Lactate dehydrogenase is found in eukaryotic electron transport chain.
   c. Bacterial terminal oxidases can be inducible.
   d. The first electron source in eukaryotic electron transport is organic.

14. Which of the following statements about mitochondria is correct?
   a. The outer mitochondrial membrane is extensively folded.
   b. The mitochondrial matrix is filled with a concentrated solution of the glycolytic enzymes.
   c. The inner membrane is permeable because it contains pores.
   d. The inner mitochondrial membrane is extensively folded.

15. Which of the following contributes nitrogen atoms to both purine and pyrimidine rings?
a. aspartate b. carbomoyl phosphate c. glutamate d. tetrahydrofolate

16. Where does energy to convert NMP to NTP come from?
a. NADP b. NADPH c. ATP d. GTP

17. Which one of the following is a common compound shared by TCA cycle and urea cycle?
a. Alpha-keto glutarate
b. Succinyl CoA
c. Oxaloacetate
d. Fumarate

18. From the muscle tissues to liver, NH_4^+ is carried as
b. Glutamine b. Glutamate c. Arginine d. Alanine

19. Vitamin B7, also called biotin, is a very good carrier of
a. Methylene group
b. Methyl group
c. Formyl group
d. Carbon dioxide

20. Catecholamines, such as epinephrine, are synthesized from
a. Tyrosine
b. Arginine and carbon dioxide
c. Cholesterol
d. Serine

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SECTION "B"
[5Q. × 3 = 15 marks]

Indicate by checking (√) of each question you have answered in the cover page of main answer book.

Answer *ANY FIVE* of the following questions:

1. What are bulk and trace elements? Illustrate with examples. [3]

2. Draw a titration curve for alanine. Clearly mark the different species of alanine present along the curve. [3]

3. Differentiate between cofactors and coenzymes. [3]

4. Describe the activity of glycogen debranching enzyme in glycogenolysis. [3]

5. Draw the structure of two phospholipids with a choline head group and a serine head group. [3]

6. Vitamins are compounds that humans and vertebrates cannot synthesize on their own and hence must be obtained from diet. Which vitamin does not fit this definition of vitamins? Why? Describe the function of Vitamin K. [1.5 + 1.5]

7. What is a sigma factor (σ)? Describe the role of sigma factor in the initiation step of RNA synthesis (transcription).

SECTION "C"
[5Q. × 5 = 25 marks]

Answer *ANY FIVE* of the following questions.

8. With appropriate diagrams differentiate between phosphorylation and ADP ribosylation. [5]

9. How are alpha and beta forms of glucose formed in solution? Describe. [5]

10. Describe with full equation and electron transfer diagram what happens in complex 3. [5]

11. Without using structures, draw a citric acid cycle. Indicate the number of carbon atoms of each intermediate. Which of these steps produce CO_2, $FADH_2$, NADH, ATP and GTP? Show in the figure. [5]

12. How are purines degraded? [5]

13. Draw the structure of proline and tryptophan. Describe the synthesis and breakdown of these amino acids. [5]

14. Write a short note on Vitamin A. Describe its biosynthesis and function. What happens during vitamin A deficiency? [5]

SECTION "D"

[2Q. × 7.5 = 15 marks]

Answer *ANY TWO* of the following questions:

15. How are peptides synthesized in vitro? Briefly mention how overall yield varies with percentage efficiency of each step.

16. Draw the structure of malonylCoA. How is it formed? Describe the seven steps of fatty acid synthesis.

17. Describe the production of urea from the urea cycle. Include a description of the synthesis of carbomoyl phosphate.