KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2019

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 18 2019

SECTION "A"
[20 Q. × 1 =20 marks]

Encircle the most appropriate option.

1. Which of the following is a reason why DNA is used as a genetic material?
   a. It can be easily hydrolyzed by water, and so is dynamic.
   b. It gives rise to high amount of errors during replication.
   c. Its conservative method of replication is easy to carry out.
   d. It is able to encode blueprint of organisms.

2. In the history of the earth, which of the events likely came first:
   a. Diversification of multicellular eukaryotes
   b. Appearance of photosynthetic sulfur bacteria
   c. Appearance of aerobic bacteria
   d. Appearance of endosymbionts

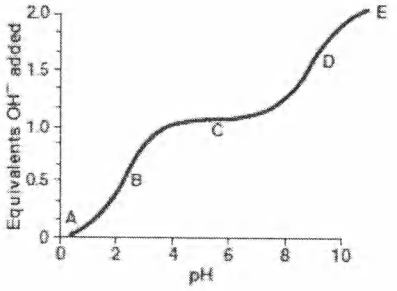
3. Which of the following is a bulk element?
   a. Na b. Mg c. Fe d. Cu

4. In beta oxidation the fourth step is called thiolysis. This process is catalyzed by an enzyme called thiolase. What type of enzyme is it?
   a. Lyase b. Isomerase
   c. Transferase d. Hydrolase

5. Which of the following statements is NOT correct?
   a. For most enzymes, the initial velocity exhibits hyberbolic dependence on [S].
   b. The molar concentration of substrates and products are equal when the rate of an enzyme-catalyzed reaction reaches half its maximum value.
   c. An enzyme is said to have become saturated with substrate when successively raising [S] fails to produce significant increase in initial velocity.
   d. When making steady-state measurements, the concentration of substrates should greatly exceed that of the enzyme catalyst.

6. Which of the following statements below is NOT correct?
   a. The three-letter code for glutamine is Glu.
   b. Glycine is optically inactive.
   c. L-amino acids are the most common amino acids in biology.
   d. Leucine, valine and alanine are non-polar amino acids.

7. The letters A through E designate certain regions on the titration curve for glycine (shown below). Which one of the following statements concerning this curve is correct?



a. Point A represents the region where glycine is deprotonated.
b. Point C represents the region where the net charge on glycine is 0.
c. Point D represents the pKa of glycine's carboxyl group.
d. Point E represents the pI for glycine.

8. A peptide bond:
a. Has a partial double bond character.
b. Is cleaved by agents that denature proteins.
c. Occurs most commonly in cis configuration.
d. Is composed of nitrogen, sulfur and oxygen atoms.

9. In glycolysis, the conversion of 1 mol of fructose 1,6-bisphosphate to 2 mol of pyruvate results in the formation of:
a. 1 mol of NADH and 1 mol of ATP
b. 2 mol of NAD+ and 2 mol of ATP
c. 2 mol of NADH and 2 mol of ATP
d. 2 mol of NADH and 4 mol of ATP

10. Which of the following best describes glucose?
a. It is a ketose and usually exists as a furanose ring in solution.
b. It is a C-4 epimer of galactose.
c. It is utilized in biological systems only in the L-isomeric form.
d. An example of heteropolymer formed from it is cellulose.

11. Which of the following best describes Fatty Acid Synthase I Complex?
a. It is a dimer of dissimilar subunits
b. It is composed do 7 different proteins
c. It dissociates into different proteins upon activation
d. It is composed of covalently linked enzymes

12. Phosphotidyl ethanolamine is formed from:
a. Cardiolipin
b. Phosphotidyl glycerol 3-phospholipid
c. Phosphotidyl glycerol
d. Phosphotidyl serine

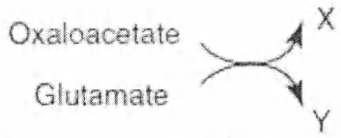
13. A biochemistry graduate student isolated all enzymes of TCA cycle including PDH complex to produce NADH. Oxidation of which of the following substrates in the citric acid cycle is not coupled to the production of NADH?
a. Succinate
b. Isocitrate
c. Malate
d. Pyruvate

14. The flow of electrons through the respiratory chain and the production of ATP are normally tightly coupled. Which of the following can uncouple the processes?
    a. Cyanide
    b. Oligomycin
    c. Physical disruption
    d. Carbon monoxide

15. Which of the following statements about purine nucleotide metabolism is NOT correct?
    a. An early step in purine biosynthesis is the formation of PRPP.
    b. Inosine monophosphate (IMP) is precursor of both AMP and GMP.
    c. L-dihydroortate is an intermediate of purine biosynthesis.
    d. Ribonucleotide reductase converts nucleoside diphosphates to the corresponding deoxyribonucleoside diphosphates.

16. Acyclovir inhibits
    a. DNA polymerase of virus
    b. Transcription in eukaryotes
    c. Transcription in bacteria
    d. Transcription in animals

17. In the transamination reaction shown below, which of the following are the products, X and Y?



    a. Alanine, alpha-ketoglutarate
    b. Aspartate, alpha-ketoglutarate
    c. Glutamate, alpha-ketoglutarate
    d. Pyruvate, aspartate

18. Which one of the following statements about amino acids is correct?
    a. All essential amino acids are glucogenic.
    b. Ornithine and citrulline are found in tissue proteins.
    c. Cysteine is an essential amino acid in individuals consuming a diet severely limited in methionine.
    d. In the presence of adequate dietary sources of alanine, phenylalanine is not an essential amino acid.

19. Retinol
    a. can be enzymatically formed from retinoic acid
    b. has alcohol functional group
    c. is the light absorbing portion of rhodopsin
    d. is phosphorylated and dephosphorylated during visual cycle

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

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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 is Levinthal's paradox?

2. Draw a Lineweaver-Burk plot for an enzyme that follows Michaelis-Menten kinetics. Label the line L1. Also label the x- and y- axes. In terms of Km and vmax, what are the values for x-intercept, y-intercept and the slope. Draw another line for a competitive inhibitor. Label this line L2.

3. Draw the structure of UDP-glucose. What is its function?

4. How is pyruvate dehydrogenase complex regulated allosterically and covalently?

5. Draw the full structures of TTP and dGTP.

6. Draw the structures of proline and methionine. How are these amino acids synthesized and degraded?

7. Write a short note on nitric oxide as a hormone.

SECTION "C"
[5Q. × 5 = 25 marks]

Answer *ANY FIVE* of the following questions.

8. How are organisms classified based on their source of carbon and energy? Describe.

9. What is lock and key hypothesis? Using metal stick and magnet, demonstrate the problem with lock and key hypothesis. What is the alternative?

10. Describe the non-oxidative phase of the pentose phosphate pathway that leads to the formation of glucose 6-phosphate from ribose 5-phosphate.

11. What are the different lipoproteins? Describe their relative density and amount of different lipids. Additionally, describe their function.

12. Describe what happens in complex 3 of the electron transport chain.

13. Without drawing structures, describe the urea cycle.

14. Write a short note on Vitamin B9.

SECTION "D"

[2Q. ×7.5 = 15 marks]

Answer *ANY TWO* of the following questions.

15. What are some of the most common protein secondary structures? Describe them.

16. Describe the four stages of beta-oxidation. Describe carbon-by-carbon how cis-9-nonadeconoic acid (19:1(Δ^9)) would be oxidized. How many NADHs, $FADH_2$ and acetyl CoAs are produced in the process?

17. How is ribonucleotide converted to deoxyribonucleotide? How is the process regulated?