

KATHMANDU UNIVERSITY  
End Semester Examination [C]  
May/June, 2019

Marks Scored:

Level : B. Tech.  
Year : II

Course : BIOT 203  
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

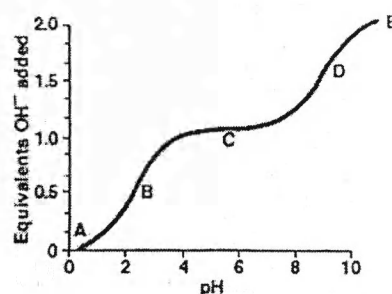
Date 03 JUN 2019

SECTION "A"

[20 Q. × 1 = 20 marks]

Choose the most appropriate answer among the given options and encircle the letter of your choice.

- Gram-negative bacteria have thin outer membrane that is NOT decorated with
  - Lipopolysaccharides
  - Porins
  - Proteosomes
  - Lipoproteins
- Organisms that use organic material for carbon source and light for energy are called
  - Photoautotrophs
  - Photoheterotrophs
  - Chemoautotrophs
  - Chemoheterotrophs
- Carbon was selected as the element of choice to build biomolecules NOT because
  - It is the smallest atom that can form 4 bonds
  - It can form single and double bond to itself
  - It can form cyclic structures
  - It can form hydrogen bonding
- Under which class of enzymes does racemase, an enzyme that interconverts stereoisomers, fall into?
  - Lyase
  - Isomerase
  - Transferase
  - Hydrolase
- A recently diagnosed hypertensive patient has been prescribed an ACE inhibitor (Angiotensin converting enzyme inhibitor), which is known to act by lowering maximum velocity. Which is NOT a possible mechanism of inhibition of this drug?
  - Competitive
  - Non-competitive
  - Mixed
  - Uncompetitive
- Which of the following statements concerning the peptide shown below is correct?  
Gly-Cys-Glu-Ser-Asp-Arg-Cys
  - The peptide contains glutamine.
  - The peptide contains a side chain with a secondary amino group.
  - The peptide contains a majority of amino acids with side chains that would be positively charged at pH 7.
  - The peptide is able to form an internal disulphide bond.
- 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?
  - Point A represents the region where glycine is fully protonated.
  - Point D represents the region where the net charge on glycine is 0.
  - Point D represents the pKa of glycine's carboxyl group.
  - Point E represents the pI for glycine.

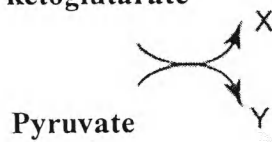


8. A peptide bond:
- Has a partial double bond character.
  - Is cleaved by agents that denature proteins.
  - Occurs most commonly in cis configuration.
  - Is composed of nitrogen, sulfur and oxygen atoms.
9. In glycolysis, the conversion of 2 mol of glyceraldehyde 3-phosphate to 2 mol of pyruvate results in the formation of:
- 1 mol of NADH and 1 mol of ATP
  - 2 mol of NAD<sup>+</sup> and 2 mol of ATP
  - 2 mol of NADH and 3 mol of ATP
  - 2 mol of NADH and 4 mol of ATP
10. Glycogenin serves as
- A primer for glycogen synthesis.
  - An enzyme that hydrolyzes glycogen.
  - An enzyme that phosphorylates glucose.
  - An enzyme that catalyzes alpha 1→6 bond formation.
11. The breakdown of one molecule of a C16 fatty acid with one double bond by beta oxidation leads to the formation of
- 8 FADH<sub>2</sub>, 8 NADH and 8 acetyl CoA molecules
  - 7 FADH<sub>2</sub>, 7 NADH and 7 acetyl CoA molecules
  - 6 FADH<sub>2</sub>, 8 NADH and 8 acetyl CoA molecules
  - 6 FADH<sub>2</sub>, 7 NADH and 8 acetyl CoA molecules
12. VLDLs
- Transport triacylglycerol from the liver to other tissues.
  - Transport cholesterol from the liver to other tissues.
  - Are formed from LDLs.
  - Transport cholesteryl ester from tissues to the liver.
13. 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. | Succinate    | NAD <sup>+</sup> | Oxaloacetate |
| c. | Fumarate     | NAD <sup>+</sup> | Oxaloacetate |
| d. | Succinyl CoA | NAD <sup>+</sup> | Oxaloacetate |
14. To study the coupling of electron transport and ATP synthesis which two quantities are assessed over time?
- Oxygen consumed and protons pumped out
  - Oxygen consumed and ATP synthesized
  - Gain of electrons by Complex 3 and protons pumped out
  - Gain of electrons by Complex 3 and ATP synthesized
15. Ribonucleotide reductase converts
- NMP to NDP
  - ADP to dADP
  - ADP to ATP
  - dADP to ADP
16. In most mammals xanthine is eliminated as
- uric acid
  - allantoin
  - urea
  - ammonium

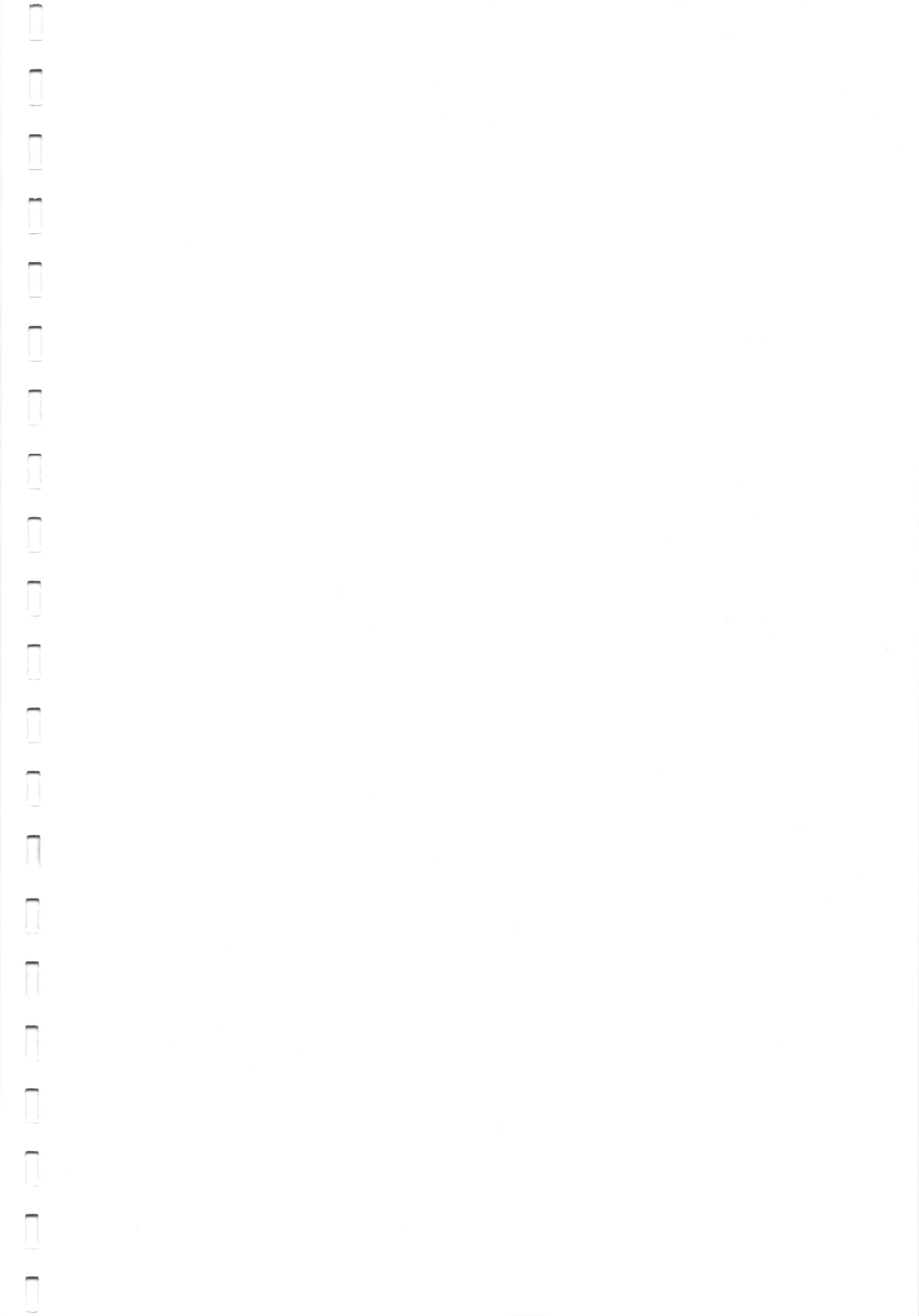
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17. In the transamination reaction shown below, which of the following are the products, X and Y?

Alpha ketoglutarate



- a. Alanine, aspartate  
b. Aspartate, alpha-ketoglutarate  
c. Glutamate, alanine  
d. Pyruvate, aspartate
18. Which of the following compound is shared by the citric acid cycle and urea cycle?  
a. Alpha-ketoglutarate  
b. Oxaloacetate  
c. Succinyl CoA  
d. Fumarate
19. Which vitamin is required for synthesis of blood clotting proteins?  
a. Vitamin A  
b. Vitamin D  
c. Vitamin E  
d. Vitamin K
20. Which of the following vitamin is required for the transfer of one carbon fragment?  
a. Folic acid  
b. Vitamin C  
c. Niacin  
d. Riboflavin



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

SECTION "B"

[5Q. × 3 = 15 marks]

Attempt *ANY FIVE* questions.

1. Write a short note on collagen.
2. Describe ADP-ribosylation as covalent modification.
3. Write a short note on starch.
4. What are the coenzymes used by pyruvate dehydrogenase complex. List their vitamin precursors and their functions.
5. Draw full structures of ADP and dTTP.
6. Draw the structures of arginine and histidine. How are these amino acids synthesized and degraded?
7. Write a short note on steroid hormones.

SECTION "C"

[5Q. × 5 = 25 marks]

Attempt *ANY FIVE* questions.

8. What are the three domains of life? Based on a phylogenetic tree in what order did they evolve? What is the difference between chemoautotrophs and photoheterotrophs? [1+2+2]
9. Derive Michealis-Menten equation with all assumptions.
10. Describe the process of glycogenesis. How is this process similar or different from DNA replication?
11. What are the different lipoproteins? Describe their relative density and amount of different lipids. Additionally, describe their function.
12. Fill in the table below:

Complex	First electron donor	Last electron acceptor	Number of protons pumped out	Overall equation
1				
2				
3				
4				

Write down the overall equation of electron transfers from 1 molecule of NADH and FADH<sub>2</sub> to oxygen.

13. Describe how atmospheric N<sub>2</sub> is converted to NH<sub>4</sub><sup>+</sup>.

14. Write a short note on Vitamin B9.

SECTION "D"

[2Q. × 7.5 = 15 marks]

Attempt *ANY TWO* questions.

15. Describe Anfinsen's experiment. What is Levinthal's paradox? [5 + 2.5]
16. Describe how cholesterol is synthesized.
17. Draw a general structure of a pyrimidine. List the building blocks and steps of pyrimidine de novo biosynthesis. Additionally, describe the breakdown of purines. [1 + 4 + 2.5]