KATHMANDU UNIVERSITY
End Semester Examination
January/February 2024

Marks Scored:

Level : B.E.
Year : II

15 FEB 2024

Course : CHEG 213
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date :

SECTION "A"
[20Q. × 0.5 = 10 marks]

Choose and encircle the most appropriate answer.

1. The term prokaryotes refer to which of the following?
   [ ] very small organism
   [ ] unicellular organism that have no nucleus
   [ ] multicellular organism
   [ ] cells that resembles animal cell more than plant cells

2. Which of the following amino acid below is the uncharged derivative of an acidic amino acid?
   [ ] cysteine [ ] tyrosine [ ] glutamine [ ] serine

3. Which of the following is the most common and stable conformation for a polypeptide chain?
   [ ] alpha helix [ ] beta pleated sheets
   [ ] anti parallel beta pleated sheet [ ] tertiary structure

4. Which of the following is "NOT" correct?
   [ ] enzymes are thermostable [ ] enzymes are biocatalyst
   [ ] enzymes are proteins [ ] all protein are enzymes

5. Which of the following enzymes break starch into sugar?
   [ ] hydrolases [ ] amylases [ ] lipases [ ] nucleases

6. In competitive inhibition, inhibitors resemble close structural similarity with the
   [ ] co-enzyme [ ] co-factor [ ] prosthetic group [ ] substrate

7. An enzyme used in both glycolysis and gluconeogenesis is
   [ ] hexokinase [ ] glucose -6-phsphatase
   [ ] 3-phosphoglycerate kinase [ ] pyruvate kinase

8. Which one of the following statements is correct, with reference to enzymes?
   [ ] holoenzyme = apoenzyme + coenzyme [ ] coenzyme = apoenzyme + holoenzyme
   [ ] holoenzyme = coenzyme + co-factor [ ] apoenzyme = holoenzyme + co-enzyme

9. _____is the process of removing the _____from pre-mRNA and joining the remaining _____together to form an mRNA molecule
   [ ] splicing, introns, exons [ ] transcription, introns, exons
   [ ] splicing, exons, introns [ ] transcription, exons, introns

10. Southern blotting is a technique used to detect and analyze

[ ] RNA molecules [ ] DNA molecules

[ ] protein molecules [ ] lipid molecules

Fill in the blanks by most appropriate *VALUE* or *WORD*

11. Sulphur containing amino acids are _____

12. Archaea and Bacteria are most similar in terms of their_____

13. A nucleotide is composed of _____

14. Nucleotides in RNA are joined by _____

15. Maltose is composed of _____ and _____

16. The point at which the line intersects the Y-axis of double reciprocal plot is numerically equal to _____

17. Krebs cycle begins with _____

18. Oxidative phosphorylation, oxidation and phosphorylation takes place simultaneously and form _____

19. If the sequence of bases in DNA is TACCGACCA, then the sequence of codons on the transcript will be _____

20. _____ a nucleic acid sequence with a reading frame that contain no stop codon, it can therefore potentially be translated into a polypeptide

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F. M. : 40

SECTION "B"
[8Q × 5 = 40 marks]

Attempt *ANY EIGHT* questions. **(Q.N. 1 is compulsory)**

1. The pentose phosphate pathway is regarded as an alternative route of the oxidation of glucose [5]
   a. Write down the reactions of pentose phosphate pathway.
   b. Explain the significance of pentose phosphate pathway.

2. The following reaction represents the enzyme catalyzed reaction in the presence of uncompetitive inhibitors [5]

$$E + S \underset{k_{-1}}{\overset{k_1}{\leftrightarrow}} ES \xrightarrow{k_2} E + P$$
$$\updownarrow k_I$$
$$ESI$$

   a. Derive the rate equation for the enzyme.
   b. Draw the standard Michaelis-Menten curve in the absence and presence of increasing amount of inhibitors.

3. a. Briefly explain the different growth medium used for the bacterial growth. [3]
   b. Write short notes on the streaking methods used for the microbe's isolation. [2]

4. a. Differentiate between monolayer and bilayer formation by lipid. [3.5]
   b. Draw structure of the Boat and Fisher Projection of glucose. [1.5]

5. a. Draw the structure of amylose and amylopectin. Shed light on the major structural difference. [2]
   b. Briefly explain the Watson – Crick model for the structure of DNA. [3]

6. a. Why are immobilized enzymes more stable? Differentiate between entrapment and surface immobilization. [0.5+2.5]
   b. What is turnover number of the enzyme? Shed light on the induced fit model and lock and key model of enzyme action. [0.5+1.5]

7. a. Differentiate between anabolic and catabolic reaction. Explain the various enzymes, coenzymes and electron carrier involved in biological oxidation. [0.5+2]
   b. Write the enzyme catalyzed reaction by citrate synthase and aconitase in TCA cycle. Name the enzyme that catalyzes this reaction and draw the structure of reactant and the

8. a. What is gene expression? Briefly explain the process of transcription and translation. [0.5+2]

   b. Briefly explain the major steps involved in gene cloning. [2.5]

9. Write short notes on: [2.5×2=5]
   a. DNA replication and mutation
   b. Genetic code