KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2025

Marks Scored:

Level : B.E.
Year : II

Course : CHEG 213
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date 02 MAR 2025

SECTION "A"

[20 Q. × 0.5 = 10 marks]

Choose and Mark [X] in the most appropriate option from each set of choices

1. α-helix and β-pleated sheet are both common polypeptide form found in
   [ ] primary structure of protein [ ] secondary structure of protein
   [ ] tertiary structure of protein [ ] quaternary structure of protein

2. _____ function as the major sources of reducing power in the cells
   [ ] NADH and FAD [ ] NAD^+ and FAD [ ] $FADH_2$ and NADH [ ] NAD^+ and $FADH_2$

3. All of the following are polysaccharides except
   [ ] glycogen [ ] starch [ ] chitin [ ] cellulose

4. An enzyme catalyzed reaction follow the Michaelis-Menten equation, when $[S] = 10 \times K_m$, the velocity of the reaction is
   [ ] 0.9 V_{max} [ ] 9 V_{max} [ ] 0.1 V_{max} [ ] V_{max}

5. _____ in glycolysis catalyzes irreversibly
   [ ] hexokinase [ ] phosphofructokinase
   [ ] pyruvate kinase [ ] hexokinase and phosphofructokinase

6. Plasmids are used as a cloning vector for which of the following reason
   [ ] can be multiplied in culture
   [ ] replicates freely outside bacterial cell
   [ ] self replicating in bacterial cell
   [ ] can be multiplied in laboratory with the help of enzyme

7. The Taq polymerase enzyme is obtained from
   [ ] Thermus aquaticus [ ] Thiabacillus ferroxidans
   [ ] Bacillus substilis [ ] Pseudomonas substilis

8. Southern blotting is
   [ ] attachment of probes to DNA fragments
   [ ] transfer of DNA fragments from electrophoretic gel to a nitrocellulose sheet
   [ ] comparison of DNA fragments of two species
   [ ] transfer of DNA fragments to electrophoretic gel from cellulose membrane

9. _____ allows DNA to replicate
   [ ] sugar phosphate backbone [ ] complementary pairing of nitrogenous bases
   [ ] disulfide bonding of the two helixes [ ] twisting of the molecules to form an α-helix

10. RNA contains which bases?
    [ ] adenine, thymine, guanine, cytosine, uracil [ ] adenine, thymine, guanine, cytosine
    [ ] thymine, guanine, cytosine, uracil [ ] adenine, guanine, cytosine, uracil

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

11. Microorganism having optimum growth temperature greater than 45°C is known as _____.

12. Archea are known as_____.

13. The transition state of a enzyme catalyzed reaction _____.

14. In a Lineweaver-Burk plot, the slope of the line is equal to _____ _____.

15. In the presence of competitive inhibitors, apparent K_m _____. _____

16. The number of ATP produced when a molecule of acetyl- CoA is oxidized through citric acid is _____

17. Enzyme _____ is major energy generating step during glycolysis

18. _____is a end product of gluconeogenesis pathway.

19. A promoter is a_____.

20. Restriction enzymes, which produces sticky end means_____.

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F. M. : 40

SECTION "B"
[8 Q. × 5 = 40 marks]

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

1. Explain in details reaction involved in TCA cycle. Also shed light on its significance. [5]

2.
   a. With suitable example explain the vector used in gene cloning. Give any four example of restriction enzyme and its application in gene cloning. [2+1]
   b. How protein synthesis can be controlled? Explain giving suitable example. [2]

3.
   a. What is EC number? An enzyme catalyzed a reaction at 55% of its V_{max}. Calculate K_m of enzyme, when the substrate concentration is 12.5 mM. [0.5+2]
   b. Discuss the role of enzyme in food and detergent industry. [2.5]

4.
   a. Briefly explain chemical and physical methods used in enzyme immobilization. [2.5]
   b. What is genetic code? Explain characteristics features of genetic code. [2.5]

5.
   a. Describe any two process involve in characterization of cloned DNA. [3]
   b. How do you differentiate between Gram-positive and Gram-negative microorganism? Demonstrate the difference in the chemical structure of these organism. [2]

6.
   a. List out difference types of culture medium used in microbe's culture. What factors influence microbial growth? [1.5+1.5]
   b. What are the difference between cofactor and coenzyme? Explain giving suitable example. [2]

7.
   a. What are the characteristics features of fatty acid? Explain the mechanism of formation of bilayer by lipid. [1+2]
   b. How cellulose and hemicellulose differ structurally? Shed light on the application of cellulose containing biomass in industry. [1.5+0.5]

8.
   a. Differentiate between protein and peptide. Why protein fold? [1.5 +0.5]
   b. How competitive, non-competitive and uncompetitive inhibitions differs from one another. Explain giving suitable example. [3]

9. Write short notes on [2× 2.5=5]
   a. ED pathway
   b. Post translation modification of protein