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Register Number

B.TECH. DEGREE EXAMINATIONS: NOVEMBER 2009

Fifth Semester

BIOTECHNOLOGY

U07BT501: Enzyme Engineering and Technology

Time: Three Hours

Maximum Marks: 100

Answer ALL the Questions:-

PART A (10 × 1 = 10 Marks)

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- 1 Which of the following is an amino acid that is found in proteins?
(a) adenosine (b) adenine (c) alanine (d) linoleic acid (e) creatine
- 2 Which of the following factors can affect enzyme activity?
(a) temperature
(b) pH
(c) the presence of certain metal ions
(d) the addition or removal of phosphate
(e) all of the above
- 3 Prosthetic groups are:
(a) required by all enzymes in the cell
(b) loosely bound to enzymes via hydrogen bonds
(c) sites on the enzyme molecule that permit allosteric modification of enzyme activity
(d) linked to phosphate groups
(e) tightly bound to enzymes and are required for their activity
- 4 The initial rate of an enzyme catalysed reaction depends on:
(a) the concentration of the enzyme
(b) the concentration of the substrate
(c) the affinity of the enzyme for its substrate
(d) all of the above
(e) none of the above

5 Kinase reactions:

- (a) inhibit ATP breakdown
- (b) involve the addition or removal of a phosphate group
- (c) involve the addition or removal of a ketone group
- (d) involve the addition or removal of an amino acid to a polypeptide chain
- (e) involve the transfer of hydrogen atoms

6 The energy for all forms of muscle contraction is provided by:

- (a) ATP
- (b) ADP
- (c) phosphocreatine
- (d) oxidative phosphorylation
- (e) generated in the mitochondria of the cell

7 For very high force contractions lasting 1-2 seconds, the initial energy source is from:

- (a) glycolysis
- (b) creatine phosphorylation
- (c) phosphocreatine stores
- (d) ATP stores
- (e) none of the above

8 Which of the following statements is false?

- (a) after a resistance training session the rate of protein synthesis in the exercised muscles is increased
- (b) after a resistance training session the rate of protein breakdown in the exercised muscles is increased
- (c) both (a) and (b)
- (d) protein cannot be used as a fuel for exercise
- (e) exercise increases the rate of secretion of growth hormone

9 Which of the following is true?

- (a) increasing the protein intake above 3 grams per kg body mass per day will stimulate muscle growth and increase strength
- (b) creatine supplements can increase muscle strength and power
- (c) amino acid supplements can increase muscle strength and power
- (d) muscle damage is induced by shortening contractions
- (e) there is an inverse relationship between dietary protein intake and total energy intake

10. Which statement about enzyme catalyzed reactions is NOT true?

- (a). Enzymes form complexes with their substrates.
- (b). Enzymes lower the activation energy for chemical reactions.
- (c). Enzymes change the K_{eq} for chemical reactions.
- (d). Many enzymes change shapes slightly when substrate binds.
- (e). Reactions occur at the "active site" of enzymes, where a precise 3D orientation of amino acids is an important feature of catalysis.

PART A (10 × 2 = 20 Marks)

- 11. What is specificity constant?
- 12. Write a simple equation for enzyme kinetics.
- 13. What happens to the enzymes, when they are exposed to altered pH conditions?
- 14. Define turn over number.
- 15. Define electrostatic partition coefficient
- 16. Briefly write about the net movement of solutes in immobilisation.
- 17. What is the principle of ultra filtration?
- 18. What are the different types of chromatographic techniques used in the separation and purification of enzymes?
- 19. Draw the schematic diagram of biosensors.
- 20. Write the role of enzymes in environmental protection.

PART C (5 × 14 = 70 Marks)

- 21 (a) Discuss in detail the classification of enzymes made with respect to catalytic activity. Give appropriate examples.

(OR)

- (b) What are the recent advances in enzyme technology.

- 22 (a) Explain the various types of enzyme inhibitions with simple extension to the Michaelis-Menten reaction scheme.

(OR)

- (b) Illustrate the mechanism of enzyme binding to their substrate and products released from the complex using first order and second order reactions.

23 (a) Make generalized comparison of different enzyme immobilization techniques.

(OR)

(b) Give any ten commercially developed products using the immobilized enzyme technology.

Time: T

24(a) List any ten important industrial enzymes obtained from animal and plant sources with appropriate examples and functions.

(OR)

(b) List any ten important industrial enzymes obtained bacterial and fungal sources with appropriate examples and functions.

25 (a) Explain the role of proteases in food industries

(OR)

(b) Explain the principle and functions of calorimetric biosensors and potentiometric biosensors with suitable diagrams and examples.

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2. Myoc

A

3. Extra

A

4. Phosp

A

5. Sphing

A

6. Colop

A

C

7. Beta p

A

C

8. Metho

A

9. Hyper

A

10. Iodine

A
