

**BRAINWARE UNIVERSITY****Term End Examination 2020 - 21****Programme – Bachelor of Science (Honours) in Biotechnology****Course Name – Enzymology****Course Code - BBT305B****Semester / Year - Semester III**

Time allotted : 85 Minutes

Full Marks : 70

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

**Group-A**

(Multiple Choice Type Question)

1 x 70=70

1. (Answer any Seventy )

(i) Induced fit theory for the formation of Enzyme-Substrate complex was proposed by

- |             |                   |
|-------------|-------------------|
| a) Koshland | b) Charles Leibeg |
| c) Buchner  | d) Fischer        |

(ii) Non-protein organic part of the enzyme is

- |               |              |
|---------------|--------------|
| a) Co-factor  | b) Co-enzyme |
| c) Apo enzyme | d) Isoenzyme |

(iii) An enzyme was crystallized for the first time by

- |                  |                   |
|------------------|-------------------|
| a) John Northrop | b) Edward Buchner |
| c) J.B. Sumner   | d) None           |

(iv) The class of enzymes that catalyzes synthetic reactions where two molecules are joined together and ATP is used is

- |               |               |
|---------------|---------------|
| a) Hydrolases | b) Lyases     |
| c) Ligases    | d) Isomerases |

(v) Enzymes are classified into how many types

- |        |          |
|--------|----------|
| a) Two | b) Three |
|--------|----------|

c) Five

d) Six

(vi) Catalytic strategy of chymotrypsin enzyme includes

- a) Covalent catalysis & metal ion catalysis    b) Metal ion catalysis & Acid base catalysis  
c) Covalent catalysis & acid base catalysis    d) None of these

(vii) Lower value of  $K_m$  indicates

- a) higher affinity of the enzyme with substrate    b) lower affinity of the enzyme with substrate  
c) no effect on the enzyme affinity with substrate    d) None of these

(viii) Name the coenzyme of riboflavin (B2)?

- a) NAD or NADP    b) FAD and FMN  
c) Coenzyme A    d) Thiamine pyrophosphate

(ix) Name the enzyme secreted by pancreas?

- a) Pepsin    b) Chymotrypsin  
c) Trypsin    d) Alcohol dehydrogenase

(x) Name the enzyme which catalyzes the oxidation-reduction reaction?

- a) Transaminase    b) Glutamine synthetase  
c) Phosphofructokinase    d) Oxidoreductase

(xi) Which of the following reactions is catalyzed by Lyase?

- a) Breaking of bonds    b) Formation of bonds  
c) Intramolecular rearrangement of bonds    d) Transfer of group from one molecule to another

(xii) What is the SI unit of enzyme activity?

- a)  $K_m$     b) Katal

c)  $K_{cat}$

d)  $V_{max}$

(xiii) Which of the following options is not an example of irreversible enzyme inhibitor?

a) Cyanide

b) Sarin

c) Diisopropyl phosphofluoridate (DIPF)

d) Statin drugs

(xiv) Lineweaver-Burk plot is also known as

a) Double reciprocal plot

b) Hanes-Woolf plot

c) Eadie-Hofstee plot

d) Steady-state equation

(xv) What is an Isozyme?

a) Same structure, different function

b) Different structure, the same function

c) Same structure, the same function

d) Different structure, different function

(xvi) Name an enzyme that is derived from the stomachs of young ruminant animals and also used in dairy industry to produce cheese?

a) Trypsin

b) Pepsin

c) Ligninase

d) Rennin

(xvii) Name an enzyme that digests fat?

a) Lipase

b) Sucrase

c) Maltase

d) Fructose

(xviii) Name an enzyme which is not proteinaceous in nature?

a) Cellulases

b) Xylanases

c) Ribozyme

d) Peptidase

(xix) Inactive enzymes which are not bound to their cofactors are called

a) Apoenzymes

b) Coenzymes

c) Enzyme inhibitors

d) Holoenzymes

(xx) The 'lock and key hypothesis' mechanism is related with:

- a) Digestion of fat in the body
- b) For enzyme specificity
- c) For the formation of vacuole
- d) Explosives

(xxi) The catalytic activity of two different enzymes can be compared by the

- a)  $K_m$  value
- b) pH of optimum value
- c) molecular size of the enzyme
- d) formation of the product

(xxii) The transition state of a catalyzed reaction is

- a) lower in energy than that of an uncatalyzed reaction
- b) lower in energy than the reaction substrate
- c) bound very weakly to the catalyst
- d) highly-populated intermediate on the reaction pathway

(xxiii) An uncompetitive inhibitor of an enzyme catalyzed reaction

- a) is without effect at saturating substrate concentration
- b) can actually increase reaction velocity in rare cases
- c) binds to the Michaelis complex and decreases  $V_{max}$
- d) All of these

(xxiv) Which of the following common drugs is not a specific enzyme inhibitor?

- a) sulfanilamide
- b) methotrexate
- c) iodine
- d) All of these

(xxv) Which of the following statements about enzymes or their function is true?

- a) Enzymes do not alter the overall change in free energy for a reaction
- b) Enzymes are proteins whose three-dimensional form is key to their function
- c) Enzymes speed up reactions by lowering activation energy
- d) All of these

(xxvi) Consider this reaction.  $A + B \rightarrow C + D + \text{energy}$ .

- a) This reaction is exergonic
- b) An enzyme could still speed the reaction
- c) A and B are reactants; C and D are products
- d) All of these are correct

(xxvii) When the velocity of enzyme activity is plotted against substrate concentration, which of the following is obtained?

- a) Hyperbolic curve
- b) Parabola
- c) Straight line with positive slope
- d) Straight line with negative slope

(xxviii) Which of the following statements is true about competitive inhibitors?

- a) It is a common type of irreversible inhibition
- b)

In the presence of a competitive inhibitor, the Michaelis-Menten equation becomes

$$V_0 = \frac{V_{\max}[S]}{\alpha K_m + [S]}$$

- c) The apparent  $K_m$  decreases in the presence of inhibitor by a factor ?
- d) The maximum velocity for the reaction decreases in the presence of a competitive inhibitor

(xxix) The rate determining step of Michaelis-Menten kinetics is

- a) The complex dissociation step to produce products
- b) The complex formation step
- c) The product formation step
- d) None of these

(xxx) The molecule which acts directly on an enzyme to lower its catalytic rate is

- a) Repressor
- b) Inhibitor
- c) Modulator
- d) Regulator

(xxxix) Which of the following is an example for irreversible inhibitor?

- a) Disulfiram
- b) Oseltamivir
- c) Protease inhibitors
- d) DIPF

(xxxix) Which of the following is an example of reversible inhibitor?

- a) DIPF
- b) Penicillin
- c) Iodoacetamide
- d) Protease inhibitors

(xxxix) The catalytic efficiency of two distinct enzymes can be compared based on which of the following factor?

- a)  $K_m$
- b) Product formation
- c) Size of the enzymes
- d) pH of optimum value

(xxxix) What is the general mechanism of an enzyme?

- a) It acts by reducing the activation energy
- b) It acts by increasing the activation energy
- c) It acts by decreasing the pH
- d) It acts by increasing the pH

(xxxix) The allosteric inhibitor of an enzyme

- a) Causes the enzyme to work faster
- b) Binds to the active site
- c) Participates in feedback regulation
- d) Denatures the enzyme

(xxxix) The nature of an enzyme is \_\_\_\_\_.

- a) Vitamin
- b) Lipid
- c) Protein
- d) Carbohydrate

(xxxix) Which of the following options is false about allosteric feedback inhibition?

- a) Bacterial enzyme system is the first known example
- b) Conversion of L-leucine to L-isoleucine
- c) Threonine dehydratase is inhibited by
- d) If the isoleucine concentration decreases,

isoleucine

the rate of threonine dehydration increases?

(xxxviii) Which of the following enzyme is responsible for the regulation of biological nitrogen fixation?

- a) Dinitrogenase reductase
- b) Dinitrogenase oxidase
- c) Phosphatase
- d) Kinase

(xxxix) Which of the following reactions is catalyzed by Lyase?

- a) Breaking of bonds
- b) Formation of bonds
- c) Intramolecular rearrangement of bonds
- d) Transfer of group from one molecule to another

(xl) Which of the following is INCORRECT for the lock-and-key model?

- a) It is used to describe the binding process
- b) The active site of the enzyme is complementary to the substrate
- c) It demonstrates enzyme-substrate complex
- d) The binding of the substrate produces a conformational change in enzyme

(xli) Which of the following options is not a catalytic strategy for an enzyme to perform specific reaction?

- a) Covalent catalysis
- b) Metal ion catalysis
- c) Michaelis constant
- d) Acid-base catalysis

(xlii) Which of the following options is not an example of irreversible enzyme inhibitor?

- a) Cyanide
- b) Sarin
- c) Diisopropyl phosphoflouridate (DIPF)
- d) Statin drugs

(xliii) Name the enzyme which is found in tears, sweat, and an egg white?

- a) Ribozyme
- b) Lysozyme
- c) Zymoge
- d) Isozymes

(xlv) Which of the following enzymes catalyzes a reaction that introduces reduced nitrogen into cellular metabolism?

- a) Bacterial glutamine synthase
- b) Bacterial dinitrogenase reductase
- c) Bacterial dinitrogenase oxidase
- d) Phosphatase

(xlvi) The catalytic activity of two different enzymes can be compared by the

- a)  $K_m$  value
- b) pH of optimum value
- c) molecular size of the enzyme
- d) formation of the product

(xlvii) Which of the following options is false?

- a) Allosteric modulators may be inhibitory or stimulatory
- b) Based on the nature of modulator, allosteric enzymes are of two types
- c) Homotropic allosteric enzymes have the substrate and modulator same
- d) Heterotropic allosteric enzymes have the substrate and modulator same

(xlviii) Which of the following statements about enzymes or their function is true?

- a) Enzymes do not alter the overall change in free energy for a reaction
- b) Enzymes are proteins whose three-dimensional form is key to their function
- c) Enzymes speed up reactions by lowering activation energy
- d) All of these

(xlix) Which of the statement is true regarding  $K_m$

- a) It is the measure of the stability of the ES complex
- b) It is the measure of the stability of the affinity of an enzyme for its substrate
- c) A high  $K_m$  indicates weak substrate binding
- d) All of these are correct

(l) Bacteria have

- a) 70S ribosomes
- b) 60S ribosomes
- c) 50S ribosomes
- d) 80S ribosomes



(l) A \_\_\_\_\_ is a biocatalyst that increases the rate of the reaction without being changed

- a) Aluminum oxide
- b) Silicon dioxide
- c) Enzyme
- d) Hydrogen peroxide

(li) Name the enzyme which catalyzes the oxidation-reduction reaction

- a) Transaminase
- b) Glutamine synthetase
- c) Phosphofructokinase
- d) Oxidoreductase

(lii) Mark the CORRECT function of enzyme, Peptidase?

- a) Cleave phosphodiester bond
- b) Cleave amino bonds
- c) Remove phosphate from a substrate
- d) Removal of H<sub>2</sub>O

(liii) Which of the following reaction is catalyzed by Lyase?

- a) Breaking of bonds
- b) Formation of bonds
- c) Intramolecular rearrangement of bonds
- d) Transfer of group from one molecule to another

(liv) Which of the following is an example of ligases enzyme

- a) Mutases
- b) Epimerases
- c) Racemases
- d) Carboxylases

(lv) What is the binding energy ?

- a) Free energy released in the formation of enzyme-substrate interaction
- b) The energy required to form a bond
- c) The energy required to bind substrate
- d) It is the activation energy

(lvi) What is the location of alcohol acetyltransferase?

- a) Lysosomes
- b) Microsomes
- c) Peroxisomes
- d) ER

(lvii) Which of the following enzyme is present in the plasma membrane?

- a) Invertase
- b) Melibiase
- c) Steryl-ester hydrolase
- d) Hexokinase

(lviii) Which of the following is false about allosteric feedback inhibition?

- a) Bacterial enzyme system is the first known example
- b) Conversion of L-leucine to L-isoleucine
- c) Threonine dehydratase is inhibited by isoleucine
- d) If the isoleucine concentration decreases, the rate of threonine dehydration increases

(lix) Which is the inducer of enzyme invertase?

- a) Starch
- b) Sucrose
- c) Galactosidases
- d) Fatty acids

(lx) What is the method of screening?

- a) To improve the microbial strain
- b) To improve the growth of an enzyme
- c) To choose appropriate microorganisms for the desired enzyme
- d) To determine the optimum conditions for growth of microbes

(lxi) Which of the following enzymes catalyze the ADP-ribosylation of key cellular enzymes or proteins?

- a) Diphteria toxin and cholera toxin
- b) Dinitrogenase reductase
- c) Protein phosphatases
- d) Kinase

(lxii) Removal of phosphoryl groups is catalyzed by

- a) Diphteria toxin and cholera toxin
- b) Dinitrogenase reductase
- c) Protein phosphatases
- d) Protein kinases

(lxiii) Which of the following enzyme catalyzes a reaction that introduces reduced nitrogen into cellular metabolism?

- a) Bacterial glutamine synthase
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c) Bacterial dinitrogenase oxidase

d) Phosphatase

(lxiv) Which of the following is false?

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b) Based on the nature of modulator, allosteric enzymes are of two types

c) Homotropic allosteric enzymes have the substrate and modulator same

d) Heterotropic allosteric enzymes have the substrate and modulator same

(lxv) In the case of allosteric enzymes what is the graphical representation when initial velocity is plotted against substrate concentration?

a) Straight line with negative slope

b) Hyperbola

c) Sigmoid curve

d) Parabola

(lxvi) Which is the enzyme that acts as a regulatory enzyme in a four-step metabolic pathway?

a) First enzyme

b) Fourth enzyme

c) Second enzyme

d) Third enzyme

(lxvii) Which of the following does not produces "Proteases"?

a) Bacillus

b) Rhizopus

c) Mucor

d) Bacillus coagulans

(lxviii) Which of the following is not included in immobilization process?

a) Absorption

b) Adsorption

c) Entrapment

d) Affinity

(lxix) Which of the following purified enzyme is used in pharmaceutical industry?

a) Subtilisin

b) Novozym-435

c) Bromelain

d) Asparaginase

(lxx) Which type of fermentation is used for large scale manufacturing of enzymes?

- a) Solid-state fermentation
- b) Submerged fermentation
- c) Solid-Gas state fermentation
- d) Gas-state fermentation