M.Sc. I Semester I Paper II Microbial Enzymology
Question Bank

Unit I General Introduction

Q.1 Choose the Correct Alternative   (each carry 1 marks)

1) --------enzyme present in saliva.
   a) Pepsin
   b) **Amylase**
   c) Lipase
   d) Trypsin
2) The protein part of enzyme is known as ------
   a) **Holoenzyme**
   b) Apo enzyme
   c) Isoenzyme
   d) All of the above
3) Following is a coenzyme -------
   a) **Nicotinamide**
   b) Riboflavin
   c) Pantothenic acid
   d) All the above
4) Most of the vitamins functions as --------
   a) Holoenzyme
   b) Harmones
   c) Coenzyme
   d) Enzyme
5) Zymogens are -------
   a) Enzyme acting upon starch
   b) Group of Zymase enzyme
   c) Inactive enzyme precursors
   d) None of the above
6) Enzyme which degrades protein are known as -----
   a) Hydrolases
   b) Proteases
   c) Lipases
   d) Ligases
7) Enzymes are mostly--------in nature.
   a) Vitamins
   b) Lipid
   c) Carbohydrates
   d) Protein
 8) Apo enzymes are----------
   a) inactive protein part of an enzyme

   b) non protein part of an enzyme
   c) A complete, biologically active conjugated enzyme
   d) It is a prosthetic group

9) ----------is a biocatalyst that increases the rate of reaction without being changed .
   a) Aluminum Oxide
   b) Silicon dioxide
   c) Enzyme
   d) Hydrogen peroxide

10) Cofactor is an
   a) Inorganic ion
   b) Organic molecule
   c) Both a) and b)
   d) None of the above

11) The General Mechanism is that an Enzyme Acts By:
   a) Reducing the activation energy
   b) Increasing activation energy
   c) Decreasing pH value
   d) Increasing the pH value

12) The Coenzyme is:
   a) Often a metal
   b) Always a protein
   c) Often a vitamin
   d) Always an inorganic compound

13)This Enzyme was First Isolated and Purified in the Form of Crystals:
   a) Urease
   b) Pepsin
   c) Amylase
   d) Ribonuclease

14) The Enzyme without its Coenzyme Known as:
   a) Apoenzyme
   b) Metalloenzyme
   c) Isoenzyme
   d) All of these

15) Name an enzyme which is not proteinaceous in nature
   a) Ribozyme
   b) Peptidiase
   c) Cellulases
   d) Xylanases

16) Apoenzyme means
   a) It is a complete, biologically active conjugated enzyme
   b) It is a prosthetic group

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    c) It is a protein portion of an enzyme
    d) It is a non-protein group

17) Most industrial enzymes are obtained from
    a) Microbes
    b) Animal Tissues
    c) Plants
    d) Insects

18) Enzymes synthesized in inactive form are called:
    a) Proenzymes
    b) Coenzymes
    c) Apoenzymes
    d) None of these

19) Father of enzymology is
    a) Antony von Leeuwenhoek
    b) Edward Howell
    c) J B Sumner
    d) John Northrop

20) Give the correct statement about enzymes
    a) Enzyme is a biocatalyst
    b) Enzyme increases the rate of reaction
    c) Enzyme decreases the activation energy of the reaction
    d) All the above

21) Enzyme that differ in amino acid sequence but catalyze the same reaction are:
    a) Co-factors
    b) Co-enzymes
    c) Apoenzymes
    d) Isoenzymes

22) The temperature at which the maximum activity of the enzyme occurs is
    a) Optimum temperature
    b) Maximum Temperature
    c) Minimum Temperature
    d) None

23) Non-protein organic part of the enzyme is:
    a) Co-factor
    b) Co-enzyme
    c) Apoenzymes
    d) Isoenzyme

24) Competitive inhibitor of an enzyme is

    a) Structural analogue of enzyme

    b) Functional analogue of enzyme

    c) Functional analogue of substrate

    d) Structural analogue of substrate

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Q.2 Fill in the blanks.   (each carry 1 marks)

1) **Enzymes** is a biocatalyst that increases the rate of reaction without undergoing any change in itself.
2) The fully active form of enzyme is **Holoenzyme.**
3) Antibodies acting as enzymes is **Abzymes.**
4) A substance that is responsible for the synthesis of a particular inducible enzymes is called as **inducer.**
5) **Product** is the substance formed after the dissociation of enzyme substrate complex.
6) **Cofactor** is a small inorganic molecule or ion that is required in addition to coenzyme by many enzymes.
7) Maximal Velocity is denoted by **Vmax.**
8) **Repressor** is a substance that prevents the formation of enzymes.
9) **Extracellular** enzymes are those enzyme which are secreted outside the cell.
10) Reaction involving two substrate is known as **Bi substrate** Reaction.

Q.3 Definition/ Answer in one sentence   (each carry 1 marks)

1) Enzyme/ Biocatalyst
   Ans:- Enzymes are the biocatalyst mostly protein in nature that brings about the biological transformation within the specified range of physiochemical parameter without undergoing any change in itself.
2) Holoenzyme
   Ans:-   The fully active enzymes which consist of apoenzyme , coenzyme and cofactors is known as holoenzymes.
3) Apo enzyme
   Ans:- The enzymes which consist of coenzymes and cofactors are known as apoenzyme.
4) Substrate
   Ans:- The substance upon which the enzyme acts is known as a substrate.
5) Coenzyme
   Ans:- A small organic compound that is essential for activity of specific enzymes.
6) Enzyme Activator
   Ans:- The molecules which activates the enzymes are known as enzyme activators.
7) Enzyme Inhibitor
   Ans:- Any substance that negatively affects the activity by drastically reducing the rate of catalysis or completely stopping the reaction is called as an inhibitor.
8) Product
   Ans:- The substance formed after the dissociation of enzyme substrate complex is known as Product.
9) Cofactor

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Ans:- A small inorganic molecule or ion that is required in addition to coenzyme by many enzymes for their action is known as cofactor.

10) Metalloenzyme

Ans:- Enzymes which carry metal ions integral constituent in their structure and are the complexes of metals with enzymes is known as metalloenzymes.

11) Marker Enzyme

Ans:- The enzymes which are found bounded in certain cell organelles that marks something is known as marker enzymes.

12) Zymogens

Ans:- The inactive precursors of enzymes which acts as a enzymes after activation by the enzyme is known as zymogen.

Q. 4 Long Answer Question   (each carry 8 marks)
   1) Explain physio chemical properties of enzymes.
   2) All the enzymes are protein but all the proteins are not enzyme, explain with examples.
   3) Describe scope of enzymology.
   4) Explain how enzyme accelerates the rate of reaction.
   5) Explain how enzyme acts a catalyst and state the differences between chemical catalyst and enzyme as catalyst.

Q. 5 Short answer questions   (each carry 4 marks)
   1) Describe in detailed properties of enzyme.
   2) Explain in detail enzyme as catalyst.
   3) Describe isoenzyme with suitable examples.
   4) Describe metalloenzyme with suitable examples.
   5) Explain enzyme activity unit in detailed.
   6) Describe in detailed Inducible enzyme
   7) Describe in detailed Constitutive enzyme.

Unit II Enzyme Isolation and purification

Q.1) Choose The Correct Alternative   (each carry 1 marks)

1) The following is not a physical method for extraction of enzymes

   a) Osmotic shock

   b) Ultrasonication

   c) Homogenization

   d) Freezing technique

2)_____is a phenomenon of assuming frequencies more than 20kHz which is above the human audibility.

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a) Homogenization

b) Ultrasonics

c) Alkali treatment

d) Freezing

3) Homogenization cannot be done by

a) Homogenizer

b) Mortar and pestle

c) French press

d) Ultra sonicator

4) Homogenization utilizing_____ is one where in manual pressure is created for cell lysis.

a) Mortar and pestle

b) Ultra sonicator

c) Freezer

d) French press

5) The technique in which the cells are subjected to cold temperature of about -15°C to -25°C is referred to as_____

a) Ultrasonics

b) Freezing

c) Homogenization

d) Osmotic shock

6) Increase or decrease in_____ leads to protonation or deprotonation of bases which leads to melting of DNA in turn isolating the enzyme after centrifugation.

a) Temperature

b) Ionic strength

c) pH

d) Detergent use

7) In ion-exchange chromatography

a) Proteins are separated on the basis of their net charge

b) Proteins are separated on the basis of their size

c) Proteins are separated on the basis of their shape

d) Either (2) or (3)

8) Gel-filtration chromatography separates on the basis of

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    a) Size and shape using porous beads packed in a column

    b) Size using porous beads packed in a column

    c) Shape using porous beads packed in a column

    d) None of the above

9) Affinity chromatography deals with the

    a) Specific binding of a protein constituents for another molecule

    b) Protein–protein interaction

    c) Protein–carbohydrate interaction

    d) None of the above

10) Proteins separation can be carried out on the basis of

    a) Net charge

    b) Solubility in salt solutions

    c) Size or mass

    d) All of these

11) The following method is not based on solubility of an enzymes.

    a) Change in pH

    b) Affinity elution

    c) Change in ionic strength

    d) Decrease in dielectric constant

12) Gel filtration chromatography is also known as

    a) Gel permeation chromatography

    b) Molecular sieve

    c) Both of these

    d) None of these

13) Which of the following hydrolytic enzyme is used for the isolation of enzymes

    a) Permease

    b) Lysozymes

    c) Amylase

    d) Ligase

14) Name the enzyme which catalyzes the oxidation-reduction reaction?

    a) Transaminase

    b) Glutamine synthetase

    c) Phosphofructokinase

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d) Oxidoreductase

15) Cell can be lysed by

    a) Osmotic shock

    b) Ultrasonication

    c) Hydrolytic enzyme

    d) All of these

Q.2 Fill in blanks   (each carry 1 marks)

1) First enzyme to be crystalized was **urease.**

2) **Ultrasonication** is the instrument which uses ultrasonic vibrations for the isolation of enzyme.

3) Gel filtration chromatography is also known as **Gel permeation chromatography**.

4) Isoelectric focusing is based on **charge/isoelectric point.**

5) Migration of charge particle under the influence of electric field is known as **electrophoresis.**

6) **Centrifugation** is the method used for the purification of enzymes based on centrifugal force.

7) Protein often precipitate on the addition of high amount of salts , this phenomenon is known as **salting out.**

8) Oxidoreductase brings about **oxidation** and **reduction.**

9) Cell when suspended in hypotonic solution will **lysed**.

10) The enzymes which transfer the functional group is **transferases.**

Q. 3 Answer in one sentence   (each carry 1 marks)

1) Define marker enzyme

Ans:- The enzymes which are found bounded in certain cell organelles that marks something is known as marker enzymes.

2) Give long form of IUB .

Ans:- International Union Of Biochemistry

3) Define inducible enzyme.

Ans:- The Enzymes which are not present in cell but they are synthesized after the appearance of their substrate only is known as inducible enzymes.

4) Define Constitutive enzyme.

Ans:-The enzymes which are always present in the cells i.e they are not synthesized after the appearance of their substrate is known as constitutive enzymes.

5) Define homogenization

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Ans:- The process of making uniform or similar things is known as homogenization.

6) Define electrophoresis

Ans:- The migration of charged particle under the influence of an electric field is termed as electrophoresis.

7) Define chromatography

Ans:- The technique used for the separation of mixture into its component is known as chromatography.

8) Define Centrifugation

Ans:- The mechanical process which involves the use of the centrifugal force to separate particles from a solution according to their size, shape and density is known as centrifugation.

9) Give 6 classes of enzyme

Ans:- Oxidoreductase,Transferases, Hydrolase, Lyases, Isomerase, Ligase

10) Give any 2 examples of hydrolytic enzyme

Ans:- Protease , Lipase, acid phosphatase.

11) Give the name of any two microbial sources of enzyme.

Ans:- *Saccharomyces cerevisae , Bacillus subtilis , Aspergillus niger.*

Q.4) Long answer question   (each carry 8 marks)

   1) Describe the criteria for purity of enzymes. Comment on test for homogenicity.
   2) Describe with examples Constitutive and inducible enzymes
   3) Explain in detail different classes of enzymes
   4) Explain enzyme purification on the basis of size: Centrifugation and dialysis
   5) Give an account on affinity chromatography
   6) Discuss any 4 methods of isolation of enzymes.
   7) Discuss about Ion exchange chromatography
   8) Elaborate electrophoresis as method of enzyme purification

Q.4) Short answer question   (each carry 4 marks)

   1) Give an outline of classification of enzymes.
   2) Describe constitutive enzymes.
   3) Explain method of isolation of enzyme by using hypotonic solutions with labeled diagram.
   4) Give an outline methods of enzyme isolation
   5) Give an account on IUB nomenclature.

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6) Describe marker enzyme.

7) Describe inducible enzyme.

8) Explain how enzyme can purified by changing pH of solution.

9) Explain centrifugation.

10) Discuss about the enzyme purification by changing

Unit III Enzyme Kinetics

Q. 1 Choose The Correct Alternative   (each carries 1 mark)

1) The KM value of an enzyme is:

   a) **The substrate concentration at half maximal velocity**

   b) Dissociation constant of enzyme substrate complex

   c) The total enzyme concentration

   d) Half the substrate concentration at maximal velocity

2) 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 the mentioned

3) Of the following which is the correct Lineweaver-Burk equation?

   a) **$1/V0 = Km/Vmax[S] + 1/Vmax$**

   b) $1/Vmax = Km/V0[S] + 1/V0$

   c) $V0 = Vmax[S]/Km + [S]$

   d) $Vmax = V0[S]/Km + [S]$

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

   a) **Km**

   b) Product formation

   c) Size of the enzymes

   d) pH of optimum value

5) The relationship between K eq, Km and Vmax is known as

   a) Michaelis Menten equation

   b) Numerical solution approach

   c) Gibbs-Helmholtz equation

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    d) **Haldane equation**

6) The plot commonly used for determining the value of Vmax is

    a) Lineweaver Burk plot

    b) Langmuir plot

    c) Eadie Hofstee plot

    d) **All of these**

7) Factors that affect the reaction rate

    a) Temperature

    b) pH

    c) Concentration of inhibitors

    d) **All of the above**

8) Enzyme kinetics mean

    a) Study of [S]

    b) **Study of rate of reaction**

    c) Study of initial velocity

    d) All of the above

9) The effect on initial velocity if the substrate concentration is low?

    a) **Increases rapidly**

    b) Increases slowly

    c) Decreases

    d) Remains constant

10) The reaction when reaches its plateau state, which type of kinetics is seen?

    a) **Zero order kinetics**

    b) First order kinetics

    c) Second order kinetics

    d) None of the above

11) In which condition, $V0 = Vmax$?

    a) **Low [S]**

    b) High [S]

    c) Low V0

    d) High V0

12) Of the following which statement is NOT true?

    a) Turnover number is also known as catalytic constant

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b) **The reaction for the formation of ES is irreversible**

c) The reaction is in steady state when rate of synthesis is equal to rate of degradation

d) Plateau is called Vmax

13) Of the following which is the slope of double-reciprocal plot?

a) Km/ V0

b) Vmax/Km

c) -1/Km

d) **None of the above**

14) Of the following which terms are involved in Michaelis-Menten Equation?

a) Vmax

b) Km

c) V0

d) **All of the above**

15) The point at which the line intersects the y-axis of double-reciprocal plot is numerically equal

to

a) Km/V0

b) Vmax/Km

c) -1/Km

d) **1/Vmax**

Q. 2) Fill in the blanks   (each carry 1 marks)

1) Vmax is define as **Maximum Velocity**

2) Michalis constant is demoted by **Km.**

3) Complete the equation V= Vmax X [s]/ **Km+** [s]

4) Complex form after the reaction of enzyme with substrate is **ES Complex.**

5) The reactions involving 2 substrate is termed as **Bisubstrate reaction.**

6) pH at which enzyme gives maximum activity is termed as **Optimum pH**

7) The energy required tp procced from reactant state to transition state is **Activation energy**

8) The temperature at which enzyme shows maximum catalytic activity is **Optimum** temperature.

9) The study of the rates of enzyme catalyzed chemical reaction is known as **enzyme**

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kinetics.

10) Enzyme kinetics was discovered by **Michalis and Menton.**

Q.3) Answer in One sentence   (each carry 1 marks)

1) Give MM equation

Ans:- V = Vmax X [S]/km + [S]

2) Define optimum temperature.

Ans:- The temperature at which enzymes shows maximum activity is termed as optimum temperature.

3) Define bi substrate reaction.

Ans:- Reaction which involves two substrate is known as bi substrate reaction.

4) Give any two significance of Vmax

Ans:- It enables us to understand the effect of modulators on enzyme catalyzed reaction, it is useful in the diagnosis of the type of inhibitor and inhibition.

5) Give the statement of steady state assumption

Ans:- It states that ES is in steady state because the rate of its formation is equals to the rate of its breakdown.

6) Define activation energy.

Ans:- The minimum amount of energy required to convert substrate into the product is called as activation energy.

7) Define optimum pH for catalytic reaction.

Ans:- The pH at which enzyme shows maximum catalytic activity is termed as Optimum pH

8) Define ES complex

Ans:- The complex formed after the association of enzyme with substrate is termed as enzyme substrate complex.

9) Give equation of LB plot

Ans:- 1/ V = Km/ V max X 1/ [S] + 1/ V max

10) Define Km

Ans:- It is defined as the rate at which the substrate concentration is half to the maximal velocity.

11) Define enzyme kinetics

Ans:- The study of rate of enzyme catalyzed reaction is known as enzyme.

Q.4 Long answer question   (each carry 8 marks)

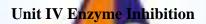Department Of Microbiology , Shri. R.L.T. College Of Science, Akola

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1) Derive the HMM equation
2) Explain effect of substrate and enzyme concentration on the progressive curve .
3) Explain bi substrate enzyme kinetics
4) Explain effect of pH and tempreture on the rate of enzyme activity.
5) Derive the equation of steady state and rapid state equilibrium.

Q.5 Short answer questions   (each carry 4 marks)

1) Explain effect of enzyme concentration on progressive curve.
2) Derive the equation for rapid state equilibrium.
3) Discuss the effect of pH on enzyme activity.
4) Describe the effect of temperature on the rate of enzyme activity.
5) Discuss the significance of Vmax and Km.
6) Explain effect of substrate concentration on the rate of enzyme activity.
7) Discuss the importance of study of enzyme kinetics.
8) Discuss about concept of ES complex.

Unit IV Enzyme Inhibition

Q.1 Choose correct alternative   (each carry 1 marks)

1) In competitive inhibition a factor is obtained from the measurement of
   a) Vmax
   b) KM
   c) Y-intercept in Lineweaver-Burk Plot
   d) None of these
2) The types of inhibition pattern based on Michaelis Menten equation are
   a) Competitive
   b) Non-competitive
   c) Uncompetitive
   d) All of the above
3) The molecule which acts directly on an enzyme to lower its catalytic rate is_____
   a) Repressor
   b) Inhibitor
   c) Modulator
   d) Regulator
4) Non-competitive inhibitor of an enzyme catalyzed reaction

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a) Decreases Vmax
b) Binds to Michaelis complex (ES)
c) **Both (a) and (b)**
d) Can actually increase reaction velocity in rare cases

5) The effect of non-competitive inhibition on a Lineweaver-Burk Plot is that
a) It can move the entire curve to the right
b) **It can change the y- intercept**
c) It can change the x- intercept
d) All of these

6) A classical uncompetitive inhibitor is a compound that binds
a) **Reversibly to the enzyme substrate complex yielding an inactive ESI complex**
b) Irreversibly to the enzyme substrate complex yielding an inactive ESI complex
c) Reversibly to the enzyme substrate complex yielding an active ESI complex
d) Irreversibly to the enzyme substrate complex yielding an active ESI complex

7) A noncompetitive inhibitor of an enzyme-catalyzed reaction.
a) Increases KM and increases Vmax
b) **Increases KM and reduces Vmax**
c) Reduces KM and increases Vmax
d) Reduces KM and reduces Vmax

8) Blocking of Enzyme Action by Blocking its Active Site is Called as:
a) Allosteric inhibition
b) Feedback inhibition
c) **Competitive inhibition**
d) Non-competitive inhibition

9) Type of inhibitor "poisons" an enzyme is
a) Non-competitive inhibitor
b) Competitive inhibitor
c) Tightly bound inhibitor
d) **Irreversible inhibitor**

10) Inhibitor binds to the enzyme-substrate and stops the enzyme from reacting with the substrate?
a) Non-competitive
b) Competitive
c) **Uncompetitive**
d) None of the above

Q.2 Fill in the blanks   (each carry 1 marks)
1) The molecule that enhances the speed of reaction in addition to the enzymes is known as **Coenzyme**.
2) Lysozyme cleaves **β-1,4 glyosidic** linkage.

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3) The inhibitor which competes with the substrate for the binding to the active site of enzyme is **Competitive inhibitor.**

4) Lysozyme cleaves **NAG** and **NAM** molecule.

5) 5 The molecule that activates the enzyme are **Activators.**

6) The inhibitor which permanently blocks the enzyme activity is **Irreversible** enzyme inhibitor.

7) Lysozyme is a **Hydrolytic** Enzyme .

8) In Lysozyme glutamate donates **proton.**

9) Uncompetitive inhibitor binds only to **ES complex**

10) An inorganic molecule or ion that is required in addition to coenzymes is **Cofactor**.

Q.3 Answer in one sentence   (each carry 1 marks)

1) Define enzyme activators.

Ans:- The molecules or ions which activates the enzymes are known as activators.

2) Give the role of co- factor in enzymatic catalysis.

Ans:- Cofactor complete the catalytic properties of an enzyme

3) Define co- enzymes.

Ans:- A small organic compound that is essential for activity of specific enzymes.

4) Define competitive inhibitor.

Ans:- The substance that is substrate analog, which competes with the substrate for the active site of the enzyme.

5) Discuss about uncompetitive inhibition.

Ans:- The uncompetitive inhibitor does not bind to the free enzyme or free substrate but binds to the ES complex only, forming the ESI complex.

6) Give any 2 examples of co-enzymes used in enzymatic catalysis.

Ans:- ATP, NADH, FAD, TPP

7) Define reversible inhibitors.

Ans:- The substance that reversibly bind to free enzyme, ES complex or both thereby temporarily reducing the rate of the enzyme catalyzed reaction.

8) Give any 1 example of activators.

Ans:- EDTA, heparin

9) Define irreversible inhibitors.

Ans:- The inhibitor which bind to the active site of an enzyme forming stable covalent clouds which completely and irreversibly decreases the rate of reaction.

10) Give the role of aspartate in lysozyme.

Ans:- It act as a stabilizer

Q.4 Long answer questions   (each carry 8 marks)

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1) Explain kinetics of reversible reactions.
2) Discuss competitive inhibitor with graphical representation.
3) Describe coenzyme and cofactors in enzymatic catalysis.
4) Describe in detail competitive and noncompetitive inhibitor.
5) Explain Mechanism of action of lysozyme.
6) Discuss about the types of inhibitor (Reversible and irreversible) in detail.

Q.5 Short answer questions   (each carry 4 marks)
1) Explain enzyme activators with examples.
2) Describe coenzymes with examples.
3) Describe the kinetics of uncompetitive inhibitor.
4) Describe cofactor used in enzymatic catalysis with examples.
5) Give an outline of action of lysozymes.
6) Compare two different types of inhibitor.
7) Describe non-competitive inhibitor with their actions.

Unit V Mechanism of Enzyme Action

Q.1 Choose correct alternative   (each carry 1 marks)
1) Lock and key model was proposed by:
   a) Henri
   b) Miachelis and Menten
   c) Emil Fischer
   d) Daniel Koshland
2) The conformational change in an enzyme after the substrate is bound that allows the chemical reaction to proceed, can be explained by
   a) Induced fit
   b) Transition
   c) Fit and fine
   d) Pasteur
3) Active site of the enzyme is
   a) Where modulators bind
   b) Where substrate bind
   c) Both
   d) None of the above
4) Change in which type of enzyme structure reduces the catalytic activity?
   a) Primary
   b) Secondary

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   c) Tertiary

   d) All of the above

5) In Which of the following model, enzyme is considered as pre-shaped?

   a) Lock and key

   b) Induced fit model

   c) Both

   d) None of the above

6) After the formation of which complex, product is formed?

   a) EI

   b) ES

   c) EP

   d) None of the above

7) Absolute substrate specificity

   a) Enzyme specific towards stereo isomers

   b) Enzyme specific towards reactions

   c) Enzyme act on more than one structurally similar enzyme

   d) Act only on one substrate

8) Induced fit model was proposed by

   a) James Watson

   b) Emil Fisher

   c) Daniel E Koshland

   d) Daniel Fisher

9) Lysozymes acts on which linkage

   a) β-1,4 glycosidic linkage

   b) α-1,4glycosidiclinkage

   c) Peptide linkage

   d) Ester linkage

10) In the action of lysozymes aspartate acts as a

   a) Proton donor

   b) Molecule stabilizer

   c) Inducer

   d) Regulator

Q.2 Fill in the blanks   (each carry 1 marks)

   1) Lock and key model is also known as **Template model.**

   2) Lock and key model was proposed by **Emil Fischer.**

   3) Induced fit model was proposed by **Koshland.**

   4) Site used for binding substrate on enzyme is **active site**.

   5) Catalytic efficiency can be explained by proximity and **distortion** effect.

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6) Enzyme and substrate interact with each other to form a transient ES complex based on **Intermolecular fit concept.**
7) Substrate induces conformational changes in enzyme is explained by using **induce fit** model
8) Three point attachment theory is used to explain **stereospecificity.**
9) Lock and key model is used to explain **absolute specify.**
10) Active Site is also known as **Substrate binding site.**

Q.3 Answer in one sentence   (each carry 1 marks)
1) Give the name of scientist who proposed lock and key model.
Ans:- Emil Fisher
2) Give and 2 advantages of lock and key model.
Ans:- It explains the stereospecificity of enzymes, it explains absolute specificity of enzyme, It explains orientation effect in rate enhancement of enzyme catalyzed reactions
3) Define catalytic site.
Ans:- The 3 dimensional site present on enzyme where the substrate bind and do the catalysis is known as catalytic site.
4) Give the name of scientist who proposed induced fit model.
Ans:- Daniel Koshland
5) Discuss the name of types of acid base catalysis.
Ans:- Specific acid base catalysis, general acid base catalysis.
6) Give the name of 2 models that are used for enzyme substrate specificity.
Ans:- Lock and key model, Induced fit model.
7) Discuss catalytic efficiency of enzymes.
Ans:- The catalytic efficiency of an enzyme is a measure that denotes the turnover number (constant) of the reaction.
8) Give any 2 factors that affect catalytic efficiency.
Ans:- Temperature, PH, substrate concentration, enzyme concentration, activators, inhibitors.
9) Give one example of three point attachment theory used for enzyme action.
Ans:- Alcohol dehydrogenase.
10) Define enzyme specificity.
Ans:- The ability of an enzyme to react with one or more substrate determine its specificity.

Q.4 Long answer questions   (each carry 8 marks)
1) Give in detail concept of enzyme and substrate specificity.
2) Describe the chemical modification of active site directed reagents.
3) Describe the theories of Mechanism of enzymatic actions.
4) Describe factors affecting catalytic efficiency of enzymes.

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Q.5 Short answer question   (each carry 4 marks)
1) Given an outline about chemistry of active site.
2) Explain lock and key model for enzyme substrate specificity.
3) Give an account on factors affecting catalytic efficiency of enzymes.
4) Explain induced fit model with well labeled diagram.
5) Explain strain and distortion effect with well labeled diagram.
6) Discuss proximity and orientation effect.