B. Sc. (Microbiology) (Sem. III) Examination
March / April - 2016
MB-06 : Bioenergetics & Enzymology

Time: Hours]

[Total Marks:

Instructions:

(1) Fill up strictly the details of signs on your answer book.

Name of the Examination:

B. Sc. (MICROBIOLOGY) (SEM. 3)

Name of the Subject:

MB-06 : BIOENERGETICS & ENZYMOLGY

Subject Code No.: 3001

Section No. (1, 2, ....) Nil

Seat No.:  

Student's Signature

(2) This exam contains 50 multiple choice questions, each worth 1 mark.

(3) Choose only ONE most appropriate answer per question.

(4) Do not crease or fold the answer sheet.

O.M.R. Sheet भरता अंशेनी अनत-पेनी सूचनाओ आपेक्ष
O.M.R. Sheet-विभाग पाउद आपेक्ष है।

Important instructions to fillup O.M.R. Sheet is given on back side of the provided O.M.R. Sheet.
1. During the experimental determination of $K_m$, the velocity of reaction is measured as the function of:

(A) Enzyme concentration
(B) Substrate concentration
(C) Catalytic concentration
(D) Product concentration

2. Enzyme substrate complex are directly observed by:

(A) Compound microscope
(B) Darkfield microscope
(C) Electron microscope and X-ray crystallography
(D) Phase contrast microscope

3. Conformational changes during substrate binding and catalysis have been demonstrated for various enzymes such as:

(A) Creatinine kinase
(B) Carboxypeptidase
(C) All of these
(D) Phosphoglucomutase

4. $K_m$ is defined as ______ in an enzyme catalysed reaction.

(A) Substrate concentration to produce maximum velocity
(B) Product concentration to produce maximum velocity
(C) Substrate concentration to produce half-maximum velocity
(D) Product concentration to produce half-maximum velocity
5 Zinc containing metalloenzyme is:
   (A) Alkaline phosphate
   (B) Carbonic anhydrase
   (C) All of these
   (D) Alcohol dehydrogenase

6 The chemical nature of inhibitors is:
   (A) Inorganic
   (B) Both Organic and Inorganic
   (C) None of these
   (D) Organic

7 Substrate analogue is the:
   (A) Enzyme which closely resembles the real substrate
   (B) Product which closely resembles the real substrate
   (C) Inhibitor which closely resembles the real substrate
   (D) Isomer which closely resembles the real substrate

8 Disadvantage of Lineweaver – Burk plot is:
   (A) Uncertainty in results
   (B) Both Long extrapolation to determine Km and Uncertainty in results
   (C) None of these
   (D) Long extrapolation to determine Km
Identify the type of inhibition of enzyme shown below:

![Enzyme Inhibition Diagram]

(A) Competitive inhibition
(B) Uncompetitive inhibition
(C) Any of these
(D) Noncompetitive inhibition

A single crystal of protein or the protein fibers is capable of deflecting:

(A) $\beta$ rays
(B) X-rays
(C) None of these
(D) $\alpha$ rays
11 Energy conserving reaction is also called:
   (A) Catabolism and fuelling reactions
   (B) Catabolism
   (C) Fuelling reactions
   (D) Anabolism

12 ______ organisms reducing the organic molecules by using CO₂ as carbon source with the release of both energy and electron.
   (A) Chemoheterotrophs
   (B) Chemoorganoheterotrophs
   (C) Chemoorganotrophs
   (D) Chemolithoautotrophs

13 Thermodynamics is a branch of science dealing with energy changes in a collection of matter, which is called:
   (A) Assembly
   (B) Reaction
   (C) None of these
   (D) System

14 The second law of thermodynamics involves, which of the following process?
   (A) Physical
   (B) Both Chemical and Physical
   (C) None of these
   (D) Chemical

15 One calorie of heat is equivalent to ______ Joules.
   (A) 4.1840
   (B) 4.8140
   (C) 4.4840
   (D) 4.4810
16 Identify the correct definition of equilibrium constant:
(A) Equilibrium is the state of a reaction where the rate of reaction in both sides is unequal, with no further net change occurring in the concentration of products.
(B) Equilibrium is the state of a reaction where the rate of reaction in both sides is equal, with no further net change occurring in the concentration of reactants and products.
(C) Equilibrium is the state of a reaction where the rate of reaction in both sides is unequal, with no further net change occurring in the concentration of reactants.
(D) Equilibrium is the state of a reaction where the rate of reaction in both sides is unequal, with no further net change occurring in the concentration of reactants and products.

17 What is the relationship between $\Delta G^o$ and $K_{eq}$?
(A) $G^o = -2.303RT\log K_{eq}$
(B) $G^o = -2.203RT\log K_{eq}$
(C) $G^o = -2.303RT\log K_{eq}$
(D) $G^o = -2.203RT\log K_{eq}$

18 Endergonic reaction is said to be:
(A) When $\Delta G^o$ is positive, the equilibrium constant is less than 1
(B) When $\Delta G^o$ is negative, the equilibrium constant is less than 2
(C) When $\Delta G^o$ is positive, the equilibrium constant is less than 2
(D) When $\Delta G^o$ is negative, the equilibrium constant is less than 1

19 Which one is the true sentence for ATP in metabolism?
(A) ATP makes endergonic reactions more favourable
(B) ATP is formed by exergonic reactions
(C) All of these
(D) ATP as a coupling agent

20 Peptidoglycan layer of the bacterial wall is activated by the higher energy compound of:
(A) Deoxythymidine
(B) Uridine
(C) Guanosine
(D) Cytidine
21 Which one is true for the standard reduction potential?

(A) The equilibrium constant of a reaction, $E^\circ$, is a measure of tendency of the donor to acquire electron

(B) The equilibrium constant for reaction, $A^\circ$, is a measure of tendency of the donor to lose electron

(C) The equilibrium constant for reaction, $E^\circ$, is a measure of tendency of the acceptant to accept electron

(D) The equilibrium constant of a reaction, $E^\circ$, is a measure of tendency of the donor to lose electron

22 The reference standard for the reduction potential is:

(A) Hydrogen system with an $E'_o$ of $-420$ millivolts

(B) Both Hydrogen system with an $E'_o$ of $-0.42$ volts and Hydrogen system with an $E'_o$ of $-420$ millivolts

(C) None of these

(D) Hydrogen system with an $E'_o$ of $-0.42$ volts

23 The difference in reduction potentials between $\text{NAD}^+ / \text{NADH}$ and $1/20_2/\text{H}_2\text{O}$ is:

(A) 1.13 volts

(B) 1.14 volts

(C) 1.15 volts

(D) 1.12 volts

24 Select the most suitable statement for ETC:

(A) The carriers are organized such that the last electron carrier has the most negative $E^\circ$ and each successive carrier is negative.

(B) The carriers are organized such that the second electron carrier has the most negative $E^\circ$ and each successive carrier is more negative.

(C) The carriers are organized such that the first electron carrier has the most negative $E^\circ$ and each successive carrier is slightly less negative.

(D) The carriers are organized such that the first electron carrier has the positive $E^\circ$ and each successive carrier is slightly less negative.
25 The nonheme iron protein active in photosynthetic electron transport system is ________.
   (A) Quinone  
   (B) Ubiquinone  
   (C) Co enzyme Q  
   (D) Ferredoxin

26 Trypsine enzyme was isolated by John H. Northrop and Kunitz from:
   (A) Beef liver  
   (B) Beef pancreas  
   (C) Swine stomach  
   (D) Beef kidney

27 The ratio of enzyme : substrate molecules can be as high as:
   (A) 1 : 10000  
   (B) 1 : 50000  
   (C) 1 : 100000  
   (D) 1 : 1000

28 Enzymes, vitamins and hormones can be classified in a single category of biological chemicals because all of them are:
   (A) Aid in regulating metabolism  
   (B) Synthesized in organisms  
   (C) Enhance the oxidative metabolism  
   (D) Proteins

29 Example of lipid hydrolyzing enzyme is:
   (A) Pepsin  
   (B) Bromolin  
   (C) Dipeptidase  
   (D) Lecithinases

30 The enzymes, which act normally within cells, are called:
   (A) Exoenzyme  
   (B) Apoenzyme  
   (C) Ferment  
   (D) Endoenzyme
31 Which of the following are co-enzymes?

(A) NADPH₂, Ca, Co
(B) NAD, NADP, FAD, FMN
(C) NAD, K, CoA
(D) Vitamin, Fe, Cu

32 Which of the following is not an oxidation-reduction enzyme?

(A) Sulfatases
(B) Oxidases
(C) Hydrolases
(D) Mutases

33 Radio immuno assay procedure for diagnosis cases of hypertension has been developed by:

(A) TIFR
(B) Both BARC and TIFR
(C) None of these
(D) BARC

34 Endonucleases promotes reactions leading to

(A) Co-angulations
(B) DNA fragmentation
(C) Recombination
(D) Polymerisation

35 Generally, co-enzymes accounts for about ______% of entire enzyme molecule.

(A) 2
(B) 3
(C) 4
(D) 1
36 The catalytic power of an enzyme is measured by the
(A) Molecular activity
(B) Both Turn over number and Molecular activity
(C) Topology
(D) Turn over number

37 A single molecule of enzyme catalase can convert ______ H₂O₂ molecules
into H₂O and CO₂ in a minute.
(A) 50,000
(B) 5,000,000
(C) 50,000,000
(D) 5,000

38 The pattern of enzyme specificity has been recognised as:
(A) Group specificity
(B) Optical specificity
(C) All of these
(D) Absolute specificity

39 The enzyme specificity of sucrose has been found mainly for:
(A) Raffinose
(B) Both Sucrose and Raffinose
(C) Glucose
(D) Sucrose

40 The value used to measure the temperature sensitivity of a biological function
is:
(A) Q₁₀
(B) Both of these
(C) None of these
(D) Temperature quotient
41. Remarkable similarity has been found in the ribonuclease structure of:
   (A) Rat and *E. coli*
   (B) Mice and humans
   (C) *E. coli* and humans
   (D) Cows and humans

42. Lysozyme is also known as:
   (A) RNase
   (B) Ribonuclease
   (C) All of these
   (D) Muramidase

43. Identify correct optimum temperature for an enzyme from below graph:

   ![Graph showing enzyme activity vs. temperature](image)

   (A) 30°C
   (B) 40°C
   (C) 60°C
   (D) 10°C

44. Lysozyme is devoid of:
   (A) Co-enzyme or metal-ion co-factors
   (B) Metal ion co-factors
   (C) Co-factors
   (D) Co enzyme

45. Complex enzyme systems that are not independent molecules, but occurs as aggregates in a mosaic pattern involving several different enzymes are known as:
   (A) Enzyme system
   (B) Both Multienzyme system and Enzyme system
   (C) None of these
   (D) Multienzyme system
46 The shape of Lysozyme is:
   (A) Roughly ellipsoidal
   (B) Smooth ellipsoidal
   (C) None of these
   (D) Ellipsoidal

47 In trypsin, an aspartate residue is present at ________:
   (A) The top of the S₁ pocket
   (B) The bottom of the S₂ pocket
   (C) The top of S₂ pocket
   (D) The bottom of the S₁ pocket

48 Activation energy is best defined as the difference between the:
   (A) Molecular levels of the ground state and the transition state
   (B) Molecular levels of the ground state and the normal state
   (C) Molecular levels of the energy gap state and the normal state
   (D) Energy levels of the ground state and the transition state

49 The higher activation energy, ________ reaction.
   (A) Faster
   (B) Slower
   (C) All
   (D) Neutral

50 In MM equation, the rate of appearance of products is proportional to the
   concentration of the enzyme-substrate complex which is generally expressed
   by the following equation:
   (A) \( V = K \neq (ES) \)
   (B) \( K = V \neq (PS) \)
   (C) \( K = V \neq (ES) \)
   (D) \( V = K \neq (PS) \)