

**D****DF-3001****B. Sc. (Microbiology) (Sem. III) Examination****March / April - 2016****MB-06 : Bioenergetics & Enzymology**

Time : Hours]

[Total Marks :

**Instructions :**

(1)

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.  
Fillup 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 & ENZYMOLOGY

Subject Code No. : 3 0 0 1 Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

- (2) This exam contains 50 multiple choice questions, each worth I mark.
- (3) Choose only ONE most appropriate answer per question.
- (4) Do not crease or fold the answer sheet.

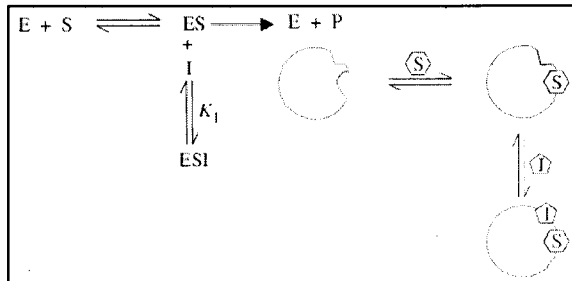
***O.M.R. Sheet ભરવા અંગેની અગત્યની સૂચનાઓ આપેલ  
O.M.R. Sheet-ની પાછળ છાપેલ છે.***

***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  $K_m$  and Uncertainty in results
  - (C) None of these
  - (D) Long extrapolation to determine  $K_m$

9 Identify the type of inhibition of enzyme shown below :



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

10 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  $\text{CO}_2$  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  $\Delta G^{\circ'}$  and  $K_{eq}$  ?
- (A)  $G^{\circ} = -2.303RT \cdot \text{Log}K_{eq}$
  - (B)  $G^{\circ} = -2.203RT \cdot \text{Log}K_{eq}$
  - (C)  $G^{\circ} = -2.303RT \cdot \text{Log}K_{eq}$
  - (D)  $G^{\circ} = -2.203RT \cdot \text{Log}K_{eq}$
- 18 Endergonic reaction is said to be :
- (A) When  $\Delta G^{\circ'}$  is positive, the equilibrium constant is less than 1
  - (B) When  $\Delta G^{\circ'}$  is negative, the equilibrium constant is less than 2
  - (C) When  $\Delta G^{\circ'}$  is positive, the equilibrium constant is less than 2
  - (D) When  $\Delta G^{\circ'}$  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  $E'_{\circ}$  of  $-420$  millivolts
  - (B) Both Hydrogen system with an  $E'_{\circ}$  of  $-0.42$  volts and Hydrogen system with an  $E'_{\circ}$  of  $-420$  millivolts
  - (C) None of these
  - (D) Hydrogen system with an  $E'_{\circ}$  of  $-0.42$  volts
- 23 The difference in reduction potentials between  $\text{NAD}^{+} / \text{NADH}$  and  $1/2\text{O}_2 / \text{H}_2\text{O}$  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



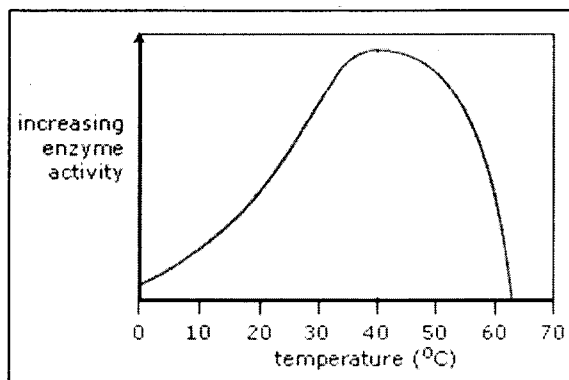
- 31 Which of the following are co-enzymes ?
- (A) NADPH<sub>2</sub>, Ca, Co
  - (B) NAD, NADP, FAD, FMN
  - (C) NAD, K, CoA
  - (D) Vitamin, Fe, Cu
- 32 Which of the following is not an oxidation-reduction enzyme ?
- (A) Sulfatases
  - (B) Oxidases
  - (C) Hydrolases
  - (D) Mutases
- 33 Radio immuno 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 \_\_\_\_\_  $\text{H}_2\text{O}_2$  molecules into  $\text{H}_2\text{O}$  and  $\text{CO}_2$  in a minute.
- (A) 50,000
  - (B) 5,00,000
  - (C) 50,00,000
  - (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)  $Q_{10}$
  - (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 :



- (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  $S_1$  pocket
  - (B) The bottom of the  $S_2$  pocket
  - (C) The top of  $S_2$  pocket
  - (D) The bottom of the  $S_1$  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)  $V = K \neq (PS)$