Roll No. .....

Question Booklet Number

O. M. R. Serial No.

M. Sc. (Biochemistry) (Second Semester) EXAMINATION, 2025-26

(New Syllabus Effective from 2023)

ENZYMOLOGY

Paper Code								
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Questions Booklet Series
D

Time : 1:30 Hours] [*Maximum Marks : 75*

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.
2. The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. All questions carry equal marks.
3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। सभी प्रश्नों के अंक समान हैं।
3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

(Remaining instructions on the last page) **(शेष निर्देश अन्तिम पृष्ठ पर)**

(Only for Rough Work)

1. Isoenzymes differ in :

(A) Function

(B) Structure

(C) Substrate

(D) Product

2. Irreversible inhibitors :

(A) Bind weakly

(B) Are temporary

(C) Bind covalently

(D) Increase activity

3. Induced fit model was proposed by :

(A) Fischer

(B) Koshland

(C) Michaelis

(D) Monod

4. Hydrolases catalyze :

(A) Oxidation

(B) Reduction

(C) Hydrolysis

(D) Isomerization

5. Homogenization is used for :

(A) Protein denaturation

(B) Cell lysis

(C) Enzyme inhibition

(D) Dialysis

6. High K_m means :

(A) High affinity

(B) High velocity

(C) Low affinity

(D) Low velocity

7. Gel filtration chromatography is also known as :

(A) Ion exchange

(B) Size exclusion

(C) Affinity

(D) Adsorption

8. Fold purification refers to :

(A) Increase in volume

(B) Increase in enzyme units

(C) Increase in specific activity

(D) Decrease in purity

9. First digit of EC number indicates :

(A) Substrate

(B) Product

(C) Cofactor

(D) Enzyme class

10. Feedback inhibition :

(A) Activates enzyme

(B) Denatures enzyme

(C) Inhibits first enzyme

(D) None of the above

11. Example of zymogen :

(A) Pepsin

(B) Pepsinogen

(C) Trypsin

(D) Amylase

12. Enzyme-substrate complex is :

(A) Permanent

(B) Temporary

(C) Irreversible

(D) Stable

13. Enzymes lower :

(A) Activation energy

(B) Free energy

(C) Equilibrium constant

(D) Substrate concentration

14. Enzymes are :

(A) Lipids

(B) Proteins

(C) Carbohydrates

(D) Nucleic acids

15. Enzymes are usually :

(A) Consumed in reactions

(B) Unchanged after reaction

(C) Converted to product

(D) Destroyed

16. Enzymes are specific due to :

(A) Shape

(B) Charge

(C) Chemical properties

(D) All of the above

17. Enzymes act best at :

(A) High temperature

(B) Optimum pH

(C) Low pressure

(D) Vacuum

18. Enzyme stabilizes :

(A) Substrate

(B) Product

(C) Transition state

(D) Cofactor

19. Enzyme specificity is mainly due to :

(A) Molecular weight

(B) Shape of enzyme

(C) Temperature

(D) Pressure

20. Enzyme kinetics depends on :

(A) Substrate concentration

(B) Enzyme concentration

(C) Temperature

(D) All of the above

21. Enzyme inhibition by heavy metals is :

(A) Competitive

(B) Non-competitive

(C) Irreversible

(D) Allosteric

22. Enzyme engineering involves :

(A) Mutation

(B) Modification

(C) Recombinant DNA

(D) All of the above

23. Enzyme classification is based on :

(A) Structure

(B) Function

(C) Color

(D) Size

24. Enzyme assays measure :

(A) Activity

(B) Structure

(C) Size

(D) Shape

25. Enzyme activity is measured in :

(A) Units

(B) Moles

(C) Joules

(D) Liters

26. Elution in affinity chromatography is done by :

(A) Heat

(B) Centrifugation

(C) Competitive ligand

(D) Filtration

27. EC number represents :

(A) Enzyme structure

(B) Classification system

(C) Gene sequence

(D) Protein size

28. DNA polymerase is :

(A) Ligase

(B) Hydrolase

(C) Transferase

(D) Lyase

29. Differential centrifugation separates based on :

(A) Charge

(B) Size and density

(C) Solubility

(D) pH

30. Dialysis is used to :

(A) Precipitate proteins

(B) Increase concentration

(C) Denature enzymes

(D) Remove small molecules

31. Denaturation affects :

(A) Primary structure

(B) Secondary/tertiary structure

(C) DNA

(D) RNA

32. DEAE-cellulose is a :

(A) Cation exchanger

(B) Anion exchanger

(C) Gel

(D) Enzyme

33. Covalent modification includes :

(A) Phosphorylation

(B) Methylation

(C) Acetylation

(D) All of the above

34. Covalent catalysis forms :

(A) Temporary bond

(B) Permanent bond

(C) Ionic bond

(D) Hydrogen bond

35. Competitive inhibitors resemble :

(A) Product

(B) Substrate

(C) Enzyme

(D) Cofactor

36. Competitive inhibition increases :

(A) K_m

(B) V_{max}

(C) Both (A) and (B)

(D) None of the above

37. CM-cellulose is a :

(A) Anion exchanger

(B) Cation exchanger

(C) Gel

(D) Buffer

38. Cell disruption methods include :

(A) Centrifugation

(B) Dialysis

(C) Filtration

(D) Sonication

39. Catalase belongs to :

(A) Transferase

(B) Oxidoreductase

(C) Hydrolase

(D) Ligase

40. Biological catalysts are :

(A) Hormones

(B) Vitamins

(C) Enzymes

(D) Minerals

41. At K_m :

(A) $V = V_{max}$

(B) $V = 1/2\ V_{max}$

(C) $V = 0$

(D) $V = 2V_{max}$

42. Apoenzyme + cofactor = :

(A) Holoenzyme

(B) Isoenzyme

(C) Prosthetic group

(D) Substrate

43. Ammonium sulfate precipitation is based on :

(A) Charge

(B) Size

(C) Solubility

(D) Density

44. Allosteric site is :

(A) Active site

(B) Regulatory site

(C) Substrate site

(D) Cofactor site

45. Allosteric enzymes :

(A) Follow Michaelis kinetics

(B) Show sigmoidal curve

(C) Are inactive

(D) Denature easily

46. Affinity chromatography is based on :

(A) Size

(B) Charge

(C) Specific binding

(D) Density

47. Active site contains :

(A) Only amino acids

(B) Binding and catalytic sites

(C) DNA

(D) Lipids

48. Active site binding involves :

(A) Weak interactions

(B) Covalent bonds

(C) Ionic bonds only

(D) Hydrogen bonds only

49. Acid-base catalysis involves :

(A) Proton transfer

(B) Electron transfer

(C) Water removal

(D) ATP hydrolysis

50. "Salting out" occurs due to :

(A) Increased solubility

(B) Decreased solubility

(C) Increased pH

(D) Increased temperature

51. The role of enzyme in catalysis is to :

(A) Increase activation energy

(B) Decrease activation energy

(C) Change equilibrium

(D) Consume substrate

52. Electrostatic catalysis stabilizes :

(A) Transition state

(B) Substrate

(C) Product

(D) Enzyme structure

53. Proteolytic activation is an example of :

(A) Allosteric regulation

(B) Covalent modification

(C) Feedback inhibition

(D) Competitive inhibition

54. Which molecule activates enzymes by binding to allosteric site ?

(A) Inhibitor

(B) Substrate

(C) Activator

(D) Product

55. Irreversible inhibition leads to :

(A) Temporary loss of activity

(B) Permanent enzyme inactivation

(C) Increased enzyme activity

(D) No effect

56. Which catalysis involves charged amino acid side chains ?

(A) Acid-base catalysis

(B) Covalent catalysis

(C) Metal ion catalysis

(D) Proximity catalysis

57. Enzyme induction refers to :

(A) Decrease in enzyme synthesis

(B) Increase in enzyme synthesis

(C) Enzyme degradation

(D) Enzyme inhibition

58. Reversible inhibitors include :

(A) Suicide inhibitors

(B) Heavy metals

(C) Competitive inhibitors

(D) Toxins

59. Which type of catalysis involves proper orientation of substrate molecules ?

(A) Covalent catalysis

(B) Proximity and orientation catalysis

(C) Acid-base catalysis

(D) Metal ion catalysis

60. Zymogens are :

(A) Inactive enzyme precursors

(B) Active enzymes

(C) Cofactors

(D) Inhibitors

61. Metal ions assist catalysis by :

(A) Denaturing enzyme

(B) Stabilizing negative charges

(C) Removing substrate

(D) Blocking active site

62. Competitive inhibition can be overcome by :

(A) Increasing enzyme concentration

(B) Adding cofactors

(C) Decreasing temperature

(D) Increasing substrate concentration

63. Which mechanism involves formation of a temporary covalent bond ?

(A) Acid-base catalysis

(B) Covalent catalysis

(C) Metal ion catalysis

(D) Electrostatic catalysis

64. Allosteric enzymes are usually :

(A) Monomeric

(B) Lipid-based

(C) Oligomeric

(D) Inactive

65. Non-competitive inhibition affects :

(A) Only K_m

(B) Only V_{max}

(C) Both K_m and V_{max} equally

(D) Neither K_m nor V_{max}

66. Which type of enzyme catalysis involves proton transfer ?

(A) Acid-base catalysis

(B) Covalent catalysis

(C) Metal ion catalysis

(D) Proximity catalysis

67. Feedback inhibition typically involves :

(A) Substrate activation

(B) End product inhibition

(C) Cofactor removal

(D) Enzyme denaturation

68. Which amino acid is commonly phosphorylated in enzyme regulation ?

(A) Glycine

(B) Alanine

(C) Serine

(D) Valine

69. Enzyme regulation by reversible phosphorylation is an example of :

(A) Allosteric regulation

(B) Competitive inhibition

(C) Feedback inhibition

(D) Covalent modification

70. Zymogens are :

(A) Active enzymes

(B) Inactive enzyme precursors

(C) Cofactors

(D) Inhibitors

71. Yield of enzyme is :

(A) Total protein

(B) Purity level

(C) Total activity retained

(D) Volume

72. V_{max} is :

(A) Minimum velocity

(B) Maximum velocity

(C) Average velocity

(D) Zero velocity

73. Uncompetitive inhibition decreases :

(A) K_m and V_{max}

(B) Only K_m

(C) Only V_{max}

(D) None of the above

74. Ultrafiltration separates based on :

(A) Charge

(B) Molecular size

(C) pH

(D) Temperature

75. Turnover number is :

(A) Substrate binding rate

(B) Product formation per enzyme per time

(C) Enzyme concentration

(D) K_m value

76. Transition state is :

(A) High energy state

(B) Stable state

(C) Low energy state

(D) Equilibrium state

77. Transferases transfer :

(A) Electrons

(B) Functional groups

(C) Water

(D) Energy

78. Tight-binding cofactors are :

(A) Coenzymes

(B) Substrates

(C) Apoenzymes

(D) Prosthetic groups

79. The first step in enzyme isolation is :

(A) Chromatography

(B) Cell disruption

(C) Dialysis

(D) Lyophilization

80. The active site of an enzyme :

(A) Binds substrate

(B) Produces energy

(C) Denatures protein

(D) Stores ATP

81. Temperature increase :

(A) Increases activity (optimum limit)

(B) Decreases activity

(C) No effect

(D) Denatures instantly

82. Specific activity increases during purification because :

(A) Total protein increases

(B) Impurities decrease

(C) Enzyme denatures

(D) Volume increases

83. Ribozymes are :

(A) Protein enzymes

(B) DNA enzymes

(C) RNA enzymes

(D) Lipid enzymes

84. pH affects :

(A) Charge

(B) Structure

(C) Activity

(D) All of the above

85. Oxidoreductases catalyze :

(A) Hydrolysis

(B) Redox reactions

(C) Isomerization

(D) Ligation

86. Organic cofactors are :

(A) Metal ions

(B) Coenzymes

(C) Salts

(D) Proteins

87. Optimum temperature for most human enzymes :

(A) 0°C

(B) 25°C

(C) 37°C

(D) 100°C

88. One enzyme unit is :

(A) 1 mole/min

(B) 1 μmol/min

(C) 1 mol/sec

(D) 1 g/min

89. Non-protein part of enzyme is :

(A) Apoenzyme

(B) Cofactor

(C) Isoenzyme

(D) Protein

90. Non-competitive inhibition affects :

(A) K_m

(B) Both (A) and (C)

(C) V_{max}

(D) None of the above

91. Michaelis-Menten equation describes :

(A) Enzyme structure

(B) Reaction rate

(C) Protein folding

(D) DNA replication

92. Metal ion catalysis involves :

(A) Cofactor binding

(B) Electron transfer

(C) Charge stabilization

(D) All of the above

93. Lyophilization is used for :

(A) Cell lysis

(B) Drying and preservation

(C) Filtration

(D) Dialysis

94. Lyases remove groups by :

(A) Hydrolysis

(B) Oxidation

(C) Non-hydrolytic means

(D) Reduction

95. Lock and key model was proposed by :

(A) Michaelis

(B) Fischer

(C) Lineweaver

(D) Pauling

96. Lineweaver-Burk plot is :

(A) Linear

(B) Hyperbolic

(C) Circular

(D) Parabolic

97. Ligases require :

(A) ATP

(B) NAD

(C) FAD

(D) H_2O

98. LDH isoenzymes differ in :

(A) Activity

(B) Structure

(C) Substrate

(D) Product

99. K_m represents :

(A) Substrate affinity

(B) Max velocity

(C) Enzyme concentration

(D) pH

100. Isomerases catalyze :

(A) Redox reactions

(B) Hydrolysis

(C) Bond formation

(D) Structural rearrangements

(Only for Rough Work)

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the correct answer and mark the same in the OMR Answer-Sheet as per the direction :

Example :

Question :

Q. 1 (A) ● (C) (D)
Q. 2 (A) (B) ● (D)
Q. 3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
6. All answers are to be given on OMR Answer Sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.
7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.
9. There will be no negative marking.
10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
11. To bring and use of log-book, calculator, pager and cellular phone in examination hall is prohibited.
12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

Impt. : On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is any discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर—A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छाँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ● (C) (D)
प्रश्न 2 (A) (B) ● (D)
प्रश्न 3 (A) ● (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
7. ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।
9. निगेटिव मार्किंग नहीं है।
10. कोई भी रफ कार्य, प्रश्न-पुस्तिका के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

महत्वपूर्ण : प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।