



Name: ..... Roll No.: .....

Branch: ..... Signature of Invigilator: .....

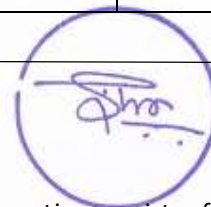
Semester: IVth

Date: 02/05/2022 (MORNING)

Subject with Code: BE216 ENZYME TECHNOLOGY

Marks Obtained	Section A (30)	Section B (20)	Total Marks (50)

INSTRUCTION TO CANDIDATE



1. The booklet (question paper cum answer sheet) consists of two sections. First section consists of MCQs of 30 marks. Candidates may mark the correct answer in the space provided / may also write answers in the answer sheet provided. The Second section of question paper consists of subjective questions of 20 marks. The candidates may write the answers for these questions in the answer sheets provided with the question booklet.
2. The booklet will be distributed to the candidates before 05 minutes of the examination. Candidates should write their roll no. in each page of the booklet.
3. Place the Student ID card, Registration Slip and No Dues Clearance (if applicable) on your desk. All the entries on the cover page must be filled at the specified space.
4. Carrying or using of mobile phone / any electronic gadgets (except regular scientific calculator)/chits are strictly prohibited inside the examination hall as it comes under the category of unfair means.
5. No candidate should be allowed to enter the examination hall later than 10 minutes after the commencement of examination. Candidates are not allowed to go out of the examination hall/room during the first 30 minutes and last 10 minutes of the examination.
6. Write on both side of the leaf and use pens with same ink.
7. The medium of examination is English. Answer book written in language other than English is liable to be rejected.
8. All attached sheets such as graph papers, drawing sheets etc. should be properly folded to the size of the answer book and tagged with the answer book by the candidate at least 05 minutes before the end of examination.
9. The door of examination hall will be closed 10 minutes before the end of examination. Do not leave the examination hall until the invigilators instruct you to do so.
10. Always maintain the highest level of integrity. Remember you are a BITian.
11. Candidates need to submit the question paper cum answer sheets before leaving the examination hall.

**Birla Institute of Technology, Mesra, Ranchi**  
**(End Semester Examination)**

**Class: B.Tech.**  
**Branch: Biotech**

**Semester: IV**  
**Session: SP/22**

**Subject: Enzyme Technology (BE216)**

**Time: 2 Hours**

**Full Marks: 50**

**Section A**

**Multiple Choice Questions (All questions compulsory)**

**[30 marks]**

1. Combination of apoenzyme and coenzyme results in
  - a) Holoenzyme
  - b) Enzyme substrate complex
  - c) Enzyme product complex
  - d) Prosthetic group
2. Enzymes are made up of:
  - a) Ribonuclease
  - b) Carbohydrates
  - c) Proteins
  - d) Both (a) & (c)
3. An uncatalyzed reaction involves
  - a) High activation energy
  - b) Low activation energy
  - c) Balanced activation energy
  - d) All of these
4. Activity of allosteric enzymes are influenced by
  - a) Allosteric modulators
  - b) Allosteric site
  - c) Catalytic site
  - d) None of the above
5. Which of the statements regarding enzymes is false?
  - a) Enzymes are proteins that function as catalysts
  - b) Enzymes are specific
  - c) Enzymes provide activation energy for reactions
  - d) Enzyme activity can be regulated
6. Allosteric enzymes show all the following features, except
  - a) Substrate binding and regulatory sites are different
  - b) Sigmoid kinetics
  - c) Binding between substrate and regulatory sites
  - d) None of the above

7. Lactate dehydrogenase is an example of
  - a) Multienzyme complex
  - b) Isozyme
  - c) Multifunctional enzyme
  - d) None of the above
8. The rate determining step of Michaelis-Menten kinetics is
  - a) The breakdown of ES complex to produce products
  - b) The complex formation step
  - c) The product formation step
  - d) None of the mentioned
9. The molecule which acts directly on an enzyme to lower its catalytic rate is
  - a) Activator
  - b) Inhibitor
  - c) Modulator
  - d) Regulator
10. Which of the following statements is true about competitive inhibitors?
  - a) It is a common type of irreversible inhibition
  - b) The maximum velocity for the reaction remains same in the presence of a competitive inhibitor
  - c) The apparent  $K_m$  decreases in the presence of inhibitor
  - d) The maximum velocity for the reaction decreases in the presence of a competitive inhibitor
11. The types of inhibition pattern based on Michaelis Menten equation are
  - a) Competitive
  - b) Non-competitive
  - c) Uncompetitive
  - d) All of the above
12. 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) None of the above
13. 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) Lock and key
  - c) Transition
  - d) None of the above
14. Which of the following statements is not true?
  - a) Enzymes are proteins that bind to specific substrates and increase the velocity of reactions involving those substrates
  - b) Enzymes function by overcoming the activation energy barrier of a

- reaction
- c) Enzymes only function when they are in intact cells
  - d) None of the above
15. 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
16. The ratio of the amount of a protein present in a sample, which is used as a measure of purification, is known as
- a) Relative ratio
  - b) Specific activity
  - c) Purity ratio
  - d) All of these
17. Milk digestibility is improved by using
- a) RNase
  - b) Glucomylase
  - c) Lactase
  - d) None of these
18. \_\_\_\_\_ is not a physical method for extraction of enzymes
- a) Osmotic shock
  - b) Ultrasonication
  - c) Freezing
  - d) Homogenization
19. The following is not a limiting factor for selection of the right starting material for enzyme production
- a) Source selection
  - b) Availability of enzyme in the source
  - c) Location of the enzyme
  - d) Isolation procedures
20. During successful purification scheme, it is expected that the
- a) specific activity decreases
  - b) specific activity increases
  - c) number of proteins in the sample decreases
  - d) both (b) & (c)
21. By addition of SDS during electrophoresis of proteins, it is possible to
- a) determine protein's isoelectric point
  - b) separate proteins on the basis of their molecular weight
  - c) determine the amino acid composition of the protein
  - d) all of the above

22. \_\_\_\_\_ is the method to remove ammonium sulphate after salting out
- a) Dialysis
  - b) Precipitation
  - c) Chromatography
  - d) Electrophoresis
23. Lipases are not used in which of the following industries?
- a) Food
  - b) Leather
  - c) Detergent
  - d) None of the above
24. Gel-filtration chromatography separates on the basis of
- a) Size using porous beads packed in a column
  - b) specific binding of a protein constituents for another molecule
  - c) Both (a) & (b)
  - d) None of the above
25. Which of the following is considered as a disadvantage to the adsorption method of immobilization?
- a) It is possible to separate and purify the enzymes while being immobilized
  - b) The enzymes are not usually deactivated
  - c) It is a reversible process
  - d) State of immobilization is dependent on solution pH, ionic strength and temperature
26. Which of the following is not a physical method of immobilization?
- a) Cross linking
  - b) Covalent bonding
  - c) Entrapment
  - d) Both (a) & (b)
27. Enzymes to be employed for industrial applications are not good targets for protein engineering
- a) True
  - b) False
28. Which of the following enzyme is used in the treatment of cancer?
- a) Trypsin
  - b) Lysozyme
  - c) Asparaginase
  - d) None of the above
29. The enzyme used in a glucose biosensor
- a) Glucose oxidase
  - b) Glucose isomerase
  - c) Glucoamylase
  - d) None of the above
30. Enzyme(s) used for the treatment of blood clots
- a) Urokinase
  - b) Streptokinase
  - c) Both (a) & (b)
  - d) Lysozyme

## Section B

Answer any 5 of the following:

[20 marks]

1. Distinguish between a multifunctional enzyme and a multi-enzyme complex giving one example in each case [4]
2. What are the salient features of allosteric enzymes and Isozymes? Give a suitable example in each case [4]
3. Classify the different types of reversible inhibitors and illustrate their effects on the apparent  $V_{\max}$  and  $K_m$  [4]
4. Identify and explain any **two** chromatographic techniques for enzyme purification [4]
5. Categorize the different types of enzyme assay methods with suitable examples [4]
6. Categorize and explain the methods of immobilization [4]
7. Illustrate the importance of enzymes in the clinical and industrial field with suitable examples in each case [4]
8. Explain electrophoresis method and its role in molecular weight determination of enzyme [4]