

THIRD SEMESTER (CBCSS—UG) DEGREE EXAMINATION, NOVEMBER 2020

Biochemistry

BCH 3C 03—BIOCHEMISTRY-III

Time : Two Hours

Maximum : 60 Marks

Section A

Answer **all** questions.
Each question carries 1 mark.

- The number of ATP molecules produced in anaerobic respiration :
 - 3.
 - 4.
 - 2.
 - 32.
- Decarboxylase belongs to the _____ class of enzymes.
 - Isomerases.
 - Lyases.
 - Ligases.
 - Oxidoreductases.
- An example for uncoupler of oxidative phosphorylation is :
 - CO.
 - Antimycin A.
 - Rotenone.
 - 2, 4-dinitrophenol.
- The cellular localization of TCA cycle is :
 - Cytosol.
 - Mitochondria.
 - Peroxisomes.
 - Plasma membrane.
- _____ is generated during Pentose Phosphate Pathway.
 - NADH.
 - NADPH.
 - FADH.
 - NADP⁺.
- Name two C₄ plants.
- Who proposed Chemiosmotic theory ?
- What are zymogens ?
- Define Bioremediation.

(9 × 1 = 9 marks)

Turn over

Section B

*Answer at least **six** questions.
Each question carries 3 marks.
All questions can be attended.
Overall Ceiling 18.*

10. How carbon fixation takes place in C₄ plants ?
11. Give any two examples of substrate level phosphorylation.
12. Write down the steps in glycogenesis.
13. Draw and explain the velocity-substrate plot for an enzyme-catalysed reaction.
14. What are high energy compounds ? Give two examples.
15. Differentiate between cyclic and non-cyclic photophosphorylation.
16. Give the industrial applications of enzymes.
17. Diagrammatically describe the structure of mitochondria.

(6 × 3 = 18 marks)

Section C

*Answer at least **three** questions.
Each question carries 7 marks.
All questions can be attended.
Overall Ceiling 21.*

18. How are carbohydrates digested in the body ?
19. Detail glyoxylate cycle. Mention its importance.
20. How are enzymes classified ?
21. What is Pentose Phosphate Pathway ? Give its reactions.
22. Enumerate the reactions of Citric acid cycle.

(3 × 7 = 21 marks)

Section D

*Answer any **one** question.
The question carries 12 marks.*

23. Give a detailed account of glycolytic reaction sequences and energy yield.
24. Elaborate on electron transport chain and oxidative phosphorylation.

(1 × 12 = 12 marks)

**THIRD SEMESTER (CBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2020**

Biochemistry

BCH 3B 04—ENZYMOLGY

Time : Two Hours

Maximum : 60 Marks

Section A

*Answer at least **eight** questions.*

Each question carries 3 marks.

All questions can be attended.

Overall Ceiling 24.

1. What is a Holoenzyme ? What are its components ?
2. Write the Lineweaver-Burk equation.
3. Define transition state and energy of activation.
4. What is meant by salting out ?
5. Write the coenzyme forms of Niacin and Riboflavin.
6. Write the zymogen form of any proteolytic enzyme and mention about its activation.
7. What is meant by irreversible enzyme inhibition ?
8. Define an allosteric enzyme. Name an allosteric enzyme.
9. What are Ribozymes ? Give an example.
10. Define V_{max} and mention its significance.
11. Write the mechanism of action of sulphadiazine.
12. What are oxidoreductases ? Give two examples.

(8 × 3 = 24 marks)

Section B

*Answer at least **five** questions.*

Each question carries 5 marks.

All questions can be attended.

Overall Ceiling 25.

13. Explain Lock and Key and Induced Fit model of enzyme substrate binding.
14. What is K_m ? Explain the significance and characteristics of K_m .
15. Explain how substrate concentration affect the velocity of enzyme catalyzed reaction.
16. Draw Lineweaver Burk plot for competitive non-competitive and uncompetitive inhibition.
17. Write a short essay on different types of enzyme specificity.
18. Discuss about the features of the active site of an enzyme.
19. Write about clinical applications of isoenzymes.

(5 × 5 = 25 marks)

Section C

*Answer any **one** question.*

The question carries 11 marks.

20. Derive Michaelis-Menton Rate equation.
21. Discuss in detail enzyme immobilization and its industrial applications.

(1 × 11 = 11 marks)

**THIRD SEMESTER (CBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2020**

Biochemistry

BCH 3B 03—TECHNIQUES IN BIOCHEMISTRY

Time : Two Hours

Maximum : 60 Marks

Section A

*Answer atleast **eight** questions.*

Each question carries 3 marks.

All questions can be attended.

Overall Ceiling 24.

1. Differentiate between Isotopes and Isobars with examples.
2. Define guard column. State its function.
3. Give any *two* differences between colorimeter and Spectrophotometer
4. Define sonication and mention its application.
5. How is isoelectric point significant in separation of proteins ?
6. Differentiate between salting in and salting out.
7. Define absorption spectra. State its significance.
8. Define ionizing radiation. Give *two* examples.
9. Define ultracentrifugation. State one application.
10. Define adsorption. Give *two* examples of adsorbents.
11. State Beer-Lambert's law and write its expression.
12. Define pulse field electrophoresis. State one application.

(8 × 3 = 24 marks)

Section B

*Answer atleast **five** questions.*

Each question carries 5 marks.

All questions can be attended.

Overall Ceiling 25.

13. Briefly explain the procedure of TLC.
14. Schematically represent the instrumentation of nephelometry. State one application.

Turn over

15. Briefly explain differential centrifugation.
16. Explain with figure the principle of affinity chromatography.
17. Brief on high voltage electrophoresis
18. Enumerate the different methods of tissue homogenization.
19. Write a brief note on autoradiography.

(5 × 5 = 25 marks)

Section C

*Answer any **one** question.*

The question carries 11 marks.

20. Describe the principle procedure and application of SDS-PAGE.
21. Detail on the different devices used to measure radioactivity.

(1 × 11 = 11 marks)

**THIRD SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2020**

Biochemistry

BTY 3C 11—ENVIRONMENTAL BIOTECHNOLOGY

Time : Three Hours

Maximum : 64 Marks

Section A

Answer all the questions in a word or phrase.

Each question carries 1 mark.

1. What is Bioaugmentation ?
2. Bioventing.
3. Superbug.
4. Surfactant.
5. Phytoremediation.
6. Landfill.
7. Medical waste.
8. Methanogenesis.
9. Propanil.
10. Biosparging.

(10 × 1 = 10 marks)

Section B

Give short answers to any seven out of ten questions.

Each question carries 2 marks.

11. Treatment of Medical waste.
12. What is *in situ* bioremediation ?
13. What are aerosols ? Give examples.
14. What is biofiltration technology ?
15. Degradation of benzene.

Turn over

16. Classification of air pollutant.
17. Smog.
18. What is acid rain ?
19. Global warming.
20. DDT.

(7 × 2 = 14 marks)

Section C

Answer in a paragraph to any four out of six questions.

Each question carries 5 marks.

21. What are the methods adopted in biodegradation of Xenobiotics ?
22. Briefly mention solid waste management.
23. Discuss about landfills ?
24. Describe the biomonitoring of air pollution.
25. Explain the domestic and industrial waste.
26. What are the causes of ozone layer depletion ?

(4 × 5 = 20 marks)

Section D

Write essays on any two.

Each question carries 10 marks.

27. What is the mechanism of oil and hydrocarbon biodegradation by microbial film ? Explain.
28. Briefly explain the effects of global warming on biological sources greenhouse gases.
29. What is environmental biotechnology ? Elaborate on the areas covered under the subject. Discuss the significance of the subject in the present day concern about the degradation of our environment
30. Explain the various methods of solid waste management. Elaborate the sequential steps.

(2 × 10 = 20 marks)

**THIRD SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2020**

Biochemistry

BCH 3C 03—BIOCHEMISTRY—III

Time : Three Hours

Maximum : 64 Marks

Section A

Answer all questions.

Each question carries 1 mark.

1. Write the coenzyme form of Thiamine and Biotin.
2. Name the zymogen form of trypsin and pepsin.
3. Name the non-gluconeogenic amino acids.
4. Which are the major enzymes that regulate glycolytic cycle ?
5. Name the hormones that regulate glycogen metabolism
6. Name the products of non-cyclic photophosphorylation.
7. Name the enzyme that catalyses substrate level phosphorylation in TCA cycle.
8. Write the full form of RUBISCO.
9. Give two inhibitors of complex-IV.
10. Name two high energy compounds.

(10 × 1 = 10 marks)

Section B

Answer any seven questions.

Each question carries 2 marks.

11. Define Km. What is its significance ?
12. What is substrate level phosphorylation ? Give example.
13. Define P/O ratio.
14. Write Michaelis-menton equation and mention the terms in it.

Turn over

15. Define optimum temperature and plot of graph of initial velocity versus temperature.
16. What is alcohol fermentation ?
17. How is pyruvate converted to Acetyl CoA ?
18. What is a holoenzyme ? Give an example.
19. Write the coenzyme forms of Niacin and Riboflavin.
20. What is the significance of Pentose Phosphate pathway ?

(7 × 2 = 14 marks)

Section C

*Answer any four questions.
Each question carries 5 marks.*

21. What are zymogens ? How are they activated ?
22. Write short note on industrial applications of enzymes.
23. How are enzymes classified ?
24. Draw Lineweaver-Burk plot for competitive inhibition.
25. Outline the arrangement of electron carriers in electron transport chain.
26. Outline the reactions of Calvin cycle.

(4 × 5 = 20 marks)

Section D

*Answer any two questions.
Each question carries 10 marks.*

27. Write an essay on enzyme inhibition.
28. Give an account of different types of enzyme specificity with examples.
29. Outline the reactions of glycolytic cycle and mention the fate of pyruvate.
30. Write an essay on digestion and absorption of carbohydrate.

(2 × 10 = 20 marks)

**THIRD SEMESTER (CUCBCSS-UG) DEGREE EXAMINATION
NOVEMBER 2020**

Biochemistry

BCH 3B 04—ENZYMOLGY

Time : Three Hours

Maximum : 80 Marks

Section A

*Answer all the questions.
Each question carries 1 mark.*

- Organic molecule in the part of a holoenzyme is called _____.
 - Coenzyme.
 - Holoenzyme.
 - Apoenzyme.
 - Cofactor.
- Which of the following is the cofactor for transaminase enzyme ?
 - TPP.
 - Biotin.
 - PLP.
 - Lipoid acid.
- Free energy value of a reversible reaction is :
 - Always favourable to the forward direction.
 - Always favourable to backward direction.
 - Depends on the concentration of reactants only.
 - Depends on the concentrations of reactants and products.
- Chymotrypsin is an example of which class of enzyme ?
 - Oxidoreductase.
 - Hydrolase.
 - Lyase.
 - Ligase.
- Which of the following occurs when a substrate and enzyme concentration increase proportionally ?
 - Rate of the reaction increase proportionally.
 - Rate of the reaction decrease.
 - Cannot affect.
 - Depend on the enzyme.

Turn over

6. Which of the following statements is correct in competitive inhibition ?
- (a) K_m decreases V_{max} decreases.
 - (b) K_m increases V_{max} increases.
 - (c) K_m no change V_{max} decreases.
 - (d) K_m increases V_{max} no change.
7. X axis and Y axis intercept in Lineweaver Burk plot is :
- (a) $1/V_{max}$ and $1/K_m$.
 - (b) $-1/K_m$ and $1/V_{max}$.
 - (c) $1/V_{max}$ and $-1/K_m$.
 - (d) $-1/V_{max}$ and $-1/K_m$.
8. Which of the following inhibitors is an example of suicide inhibitors of enzyme ?
- (a) Pencillin.
 - (b) Sulfa drugs.
 - (c) Methotrexate.
 - (d) Chloramphenicol.
9. Which enzyme is active in the phosphorylated form in glycogen metabolism ?
- (a) Glycogen phosphorylase.
 - (b) Glycogen synthase.
 - (c) Sucrose synthase.
 - (d) Starch synthase.
10. Which of the following is an allosteric activator of AT Case ?
- (a) Glucose.
 - (b) ATP.
 - (c) Fructose.
 - (d) CTP.
11. Which isoforms of LDH is predominant in heart muscle ?
- (a) M_4 .
 - (b) H_4 .
 - (c) M_3H .
 - (d) M_2H_2 .
12. Zymogen of pepsin is :
- (a) Propepsin.
 - (b) Pepsinogen.
 - (c) Prepropepsin.
 - (d) Trypsin.
13. An enzyme used for meat tenderisation is :
- (a) α - amylase.
 - (b) Papain.
 - (c) Chymotrypsin.
 - (d) Pepsin.
14. The enzyme commonly used in ELISA is :
- (a) Hexokinase.
 - (b) Catalase.
 - (c) Alkaline Phosphatase.
 - (d) Fumarase.

15. _____ is the number of substrate molecules converted into product by an enzyme molecule in a unit time when the enzyme is fully saturated with substrate.
16. In Michaelis Menten plot of enzyme activity (reaction rate versus substrate concentration), the reason that the curve reaches a plateau and does not increase any further upon adding more substrate is that :
- (a) The active site is saturated with substrate.
 - (b) There is a competitive inhibitor present.
 - (c) The enzyme is locked in an inactive conformation.
 - (d) All substrate have been converted to product.

(16 × 1 = 16 marks)

Section B

*Answer any **eight** questions.
Each question carries 3 marks.*

17. Write the structure of pyridoxal phosphate.
18. Write briefly on specificity of enzymes.
19. Comment on the effect of temperature on velocity of enzyme catalysed reaction.
20. Definition and significance of V_0 and V_{max} .
21. Distinguish between IU and Katal.
22. Write briefly on mixed inhibition.
23. What are the main properties of enzymes that make them especially useful catalysts ?
24. Explain isoenzymes with one example.
25. Write the modified form of Michaelis Menten equation, when $K_m = [S]$?
26. Explain allosteric enzyme with one example.

(8 × 3 = 24 marks)

Section C

*Answer any **four** questions.
Each question carries 5 marks.*

27. Write the structure of any two coenzyme and mention one reaction in which the coenzyme participate.
28. Explain the role of free energy in an enzyme catalysed reaction.
29. Explain the effect of pH on enzyme catalysed reaction with one example.

Turn over

30. Explain the advantage of Lineweaver Burk plot over Michaelis Menten plot with the help of graph.
31. Explain irreversible inhibition with two example.
32. Why digestive enzyme like trypsin is stored in the form of zymogen, trypsinogen in the pancreatic duct ? How is it activated ?

(4 × 5 = 20 marks)

Section D

*Answer any two questions.
Each question carries 10 marks.*

33. Describe enzyme purification by affinity chromatography.
34. Describe the various factors affecting rate of enzyme catalysed reaction.
35. Write an essay on industrial and clinical uses of enzymes.

(2 × 10 = 20 marks)

**THIRD SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2020**

Biochemistry

BCH 3B 03—TECHNIQUES IN BIOCHEMISTRY

Time : Three Hours

Maximum : 80 Marks

Section A

Answer the questions in one word or phrase.

Each question carries 1 mark.

1. Name a tissue homogeniser which works on the principle of sound.
2. By solvent fractionation we can separate a group of lipids. State whether true or false.
3. Filtration through a semi permeable membrane using pressure is termed as _____.
4. Paper chromatography's underlying principle is partition co-efficient. State whether true or false.
5. In TLC, the silica slurry acts as _____.
6. In ion exchange chromatography, separation is based on _____.
7. pH of an electrophoresis system is maintained using _____.
8. In PAGE, Acryl amide cross links with _____ to form gel.
9. In SDS PAGE, SDS stands for _____.
10. Which centrifugation technique is employed to effectively separate particles of different sizes ?
11. Cell organelles can be separated by ultracentrifugation. State whether true or false.
12. Amino acids can be separated using electrophoresis. Is the statement true ?
13. Turbidity can be measured using _____.
14. In GM tube which gas is used as the detecting gas ?
15. In Scintillation counter, Sodium Iodide is used as _____.
16. _____ is employed for the detection of materials that possess radioactive properties by using X-ray films.

(16 × 1 = 16 marks)

Turn over

Section B

*Answer any **eight** questions
Each question carries 3 marks.*

17. Give a short account on solvent extraction.
18. What is reverse dialysis ? What are the advantages of it ?
19. What is the principle of adsorption chromatography ?
20. What are the applications of TLC ?
21. Give a short account on membrane electrophoresis.
22. Explain the theory of immune electrophoresis.
23. Write down the principle of sedimentation technique
24. Write a short note on the different centrifuges.
25. Give a short account on molar extinction co-efficient.
26. What is a scintillation Counter ?

(8 × 3 = 24 marks)

Section C

*Answer any **four** questions.
Each question carries 5 marks.*

27. Describe the various types of solvent extraction and fractionation techniques.
28. Give short note on affinity chromatography.
29. With the help of a flow chart describe the experimental set up of HPLC.
30. Describe the working and applications of differential and density gradient centrifugation.
31. Give a brief account on the various spectrophotometers.
32. Write short notes on Radioimmunoassay.

(4 × 5 = 20 marks)

Section D

Answer any two questions.

Each question carries 10 marks.

33. What is the basic principle of chromatography? Explain the principle and applications of partition chromatography. Write down the instrumental set up of HPTLC.
34. Explain the theory of electrophoresis. Outline the experimental set up of SDS PAGE. Explain the advantages and principle of 2D gel electrophoresis.
35. Write an essay on the principle and instrumentation for the measurement of radioactivity. Differentiate between GM and Scintillation counters.

(2 × 10 = 20 marks)

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**THIRD SEMESTER (CBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021**

Biochemistry

BCH 3C 03—BIOCHEMISTRY—III

(2020 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A

Answer all questions.

Each question carries 1 mark.

1. Name the components in a holoenzyme.
2. The double reciprocal plot is also known as _____.
3. Give an example for an oxidoreductase.
4. The pH at which an enzyme exhibits maximum activity is called _____.
5. Write the name of enzyme that catalyses substrate level phosphorylation in TCA cycle.
6. Name two uncouplers of ETC.
7. What are the two major products of pentose phosphate pathway ?
8. Name the two non-gluconeogenic amino acids.
9. Name the first carbon fixation product in C₄ plants.

(9 × 1 = 9 marks)

Section B

Answer at least six questions.

Each question carries 3 marks.

All questions can be attended.

Overall Ceiling 18.

10. Write about Kranz anatomy and its significance.
11. Write down Michaelis rate equation and explain the terms in it.
12. List out the irreversible reactions in glycolysis.

Turn over

13. Mention the role of RUBISCO in photosynthesis.
14. What are Zymogens ? Explain their activation with a suitable example.
15. What is meant by geometrical specificity of enzymes ?
16. Brief on C2 plants.
17. Write about high energy compounds with suitable examples.

(6 × 3 = 18 marks)

Section C

Answer at least **three** questions.

Each question carries 7 marks.

All questions can be attended.

Overall Ceiling 21.

18. Discuss about the arrangement of electron carries in ETC.
19. How are enzymes classified ?
20. Explain glyoxylate cycle.
21. Write about different types of enzyme specificity.
22. Outline pentose phosphate pathway.

(3 × 7 = 21 marks)

Section D

Answer any **one** question.

The question carries 12 marks.

23. Discuss about the different factors affecting velocity of enzyme catalysed reaction.
24. Give a detailed account on gluconeogenesis.

(1 × 12 = 12 marks)

**THIRD SEMESTER (CBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021**

Biochemistry

BCH 3B 04—TECHNIQUES IN BIOCHEMISTRY

(2020 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A

*Answer at least **eight** questions.*

Each question carries 3 marks.

All questions can be attended.

Overall Ceiling 24.

1. Explain reverse dialysis.
2. Differentiate between mobile phase and stationary phase in chromatography.
3. State Beer-Lambert's law.
4. Write the principle of partition chromatography.
5. Mention the role of APS and TEMED in electrophoresis.
6. Write about the different types of rotors.
7. Brief on 'salting out' of proteins.
8. What are polyampholytes and mention its use.
9. Write the principle of Nephelometry.
10. What are Isotopes ? Give two examples.
11. Differentiate between ionizing and non-ionizing radiations.
12. What are scintillation cocktails ? Give an example.

(8 × 3 = 24 marks)

Turn over

Section B

*Answer at least **five** questions.*

Each question carries 5 marks.

All questions can be attended.

Overall Ceiling 25.

13. Give a brief account of affinity chromatography.
14. Explain Density Gradient centrifugation.
15. Write about Isoelectric focussing.
16. Give a brief account of the instrumentation and working of a spectrophotometer.
17. Write about descending paper chromatography.
18. Explain the technique of Radioimmunoassay.
19. Give a brief account of scintillation counters.

(5 × 5 = 25 marks)

Section C

*Answer any **one** question.*

The question carries 11 marks.

20. Explain in detail the principle, procedure, and applications of Ion exchange chromatography.
21. Give a detailed account of the principle, procedure, and applications of SDS-PAGE.

(1 × 11 = 11 marks)

THIRD SEMESTER (CBCSS—UG) DEGREE EXAMINATION, NOVEMBER 2021

Biochemistry

BCH 3B 03—BIOMOLECULES-II

(2020 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A*Answer at least **eight** questions.**Each question carries 3 marks.**All questions can be attended.**Overall Ceiling 24.*

1. Give the structure and functions of glutathione.
2. What are protective proteins ? Give an example.
3. Write short note on PDB.
4. Define salting in and salting out.
5. Draw the structure of ribose and deoxy ribose.
6. Brief on cot curve and its significance.
7. Write short note on RASWIN.
8. Comment on the exo and endo conformation of sugars.
9. Write about the unusual bases in nucleic acids.
10. Comment on the changes occurring to a protein upon denaturation.
11. Diagrammatically represent a RNA polynucleotide.
12. Write about any two chemical reactions of proteins.

(8 × 3 = 24 marks)

Section B*Answer at least **five** questions.**Each question carries 5 marks.**All questions can be attended.**Overall Ceiling 25.*

13. How are proteins classified based on composition ?
14. Explain Sanger's method of N-terminal determination of a polypeptide.
15. Write a short essay on different data mining methods.

Turn over

16. Write a comparison between the Z and B forms of DNA.
17. Give an account of different databanks.
18. Explain the forces responsible to maintain the protein structure at different levels of organisation.
19. Discuss about the protein precipitation reactions.

(5 × 5 = 25 marks)

Section C

*Answer any **one** question.
The question carries 11 marks.*

20. Give a detailed account of the conformation and types of secondary structures in proteins.
21. Discuss in detail the different methods of DNA sequencing.

(1 × 11 = 11 marks)

**THIRD SEMESTER (CBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021**

Biochemistry

BCH 3C 03—BIOCHEMISTRY—III

(2019—2020 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A

Answer all questions.

Each question carries 1 mark.

1. Example for a high energy compound is _____.
(a) Pyruvate. (b) Glucose.
(c) Phosphoenol pyruvate. (d) Adenosine.
2. _____ inhibits electron transport chain.
(a) 2,4-DNP. (b) Amytal.
(c) Aspirin. (d) Puromycin.
3. The enzyme secreted by the pancreas during digestion of carbohydrate is :
(a) Maltase (b) α -amylase.
(c) Lactase. (d) Sucrose.
4. The SI unit of enzyme activity is :
(a) mg/ml. (b) mole.
(c) katal. (d) mg.
5. Define redox reaction.
6. Write Michaelis-Menten equation.
7. Define Calvin cycle.
8. Define glycolysis.
9. Write about the group specificity of an enzyme.

(9 × 1 = 9 marks)

Turn over

Section B

Answer at least six questions.

Each question carries 3 marks.

All questions can be attended.

Overall Ceiling 18.

10. What is meant by an uncoupler of oxidative phosphorylation ? Give two examples.
11. How is aerobic glycolysis different from anaerobic glycolysis ?
12. Differentiate anabolism and catabolism with one example each.
13. Write the significance of pentose phosphate pathway.
14. Define Km. Give its significance.
15. What is Kranz anatomy ? Give its importance.
16. How do irreversible inhibition of enzyme takes place ?
17. Comment on induced fit hypothesis.

(6 × 3 = 18 marks)

Section C

Answer at least three questions.

Each question carries 7 marks.

All questions can be attended.

Overall Ceiling 21.

18. Give a brief account of electron transport chain.
19. Briefly explain the role of cAMP in glycogen metabolism.
20. Detail the factors affecting the velocity of an enzyme catalysed reaction.
21. How are carbohydrates absorbed in the body ?
22. Distinguish between substrate level phosphorylation and oxidative phosphorylation.

(3 × 7 = 21 marks)

Section D

Answer any one question.

The question carries 12 marks.

23. Enumerate gluconeogenesis.
24. Describe different types of reversible enzyme inhibition.

(1 × 12 = 12 marks)

THIRD SEMESTER (CBCSS—UG) DEGREE EXAMINATION, NOVEMBER 2021

Biochemistry

BCH 3B 04—ENZYMOLGY

(2019—2020 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A*Answer at least **eight** questions.**Each question carries 3 marks.**All questions can be attended.**Overall Ceiling 24.*

1. Define Specific activity and Katal.
2. What is the role of a metal ion in metalloenzymes ?
3. Write the one coenzyme form each of Vitamin B₁, B₂, B₃ and B₆.
4. What is meant by geometrical specificity of an enzyme ? Give an example.
5. Define optimum temperature of an enzyme and represent it graphically.
6. Write down Michaelis-Menton equation and mention the terms in it.
7. Write the significance of K_{cat}/K_m ratio.
8. How are enzymes made used in the technique of ELISA ?
9. Write about the mechanism of action of methotrexate.
10. What is Lock and Key model of enzyme-substrate binding ?
11. Write about abzymes and list out any two applications of abzymes.
12. What is a multienzyme complex ? Give two examples.

(8 × 3 = 24 marks)

Section B*Answer at least **five** questions.**Each question carries 5 marks.**All questions can be attended.**Overall Ceiling 25.*

13. Give a brief description about the different methods of enzyme immobilization.
14. Write about covalent modification of enzyme with glycogen phosphorylase as example.

Turn over

15. How are enzymes classified ? Write with suitable examples.
16. Write a short essay on isoenzymes.
17. Discuss about the industrial applications of enzymes.
18. Write about allosteric enzymes with a suitable example.
19. Give a brief account of the criteria for the purity of enzymes.

(5 × 5 = 25 marks)

Section C

Answer any one question.

The question carries 11 marks.

20. Explain the different factors affecting the velocity of enzyme catalyzed reaction.
21. Discuss in detail reversible enzyme inhibition.

(1 × 11 = 11 marks)

THIRD SEMESTER (CBCSS—UG) DEGREE EXAMINATION, NOVEMBER 2021

Biochemistry

BCH 3B 03—TECHNIQUES IN BIOCHEMISTRY

(2019—2020 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A*Answer at least eight questions.**Each question carries 3 marks.**All questions can be attended.**Overall Ceiling 24.*

1. Name the sources of UV and visible radiation in a spectrophotometer.
2. Define lyophilisation. Give two applications.
3. Mention any two methods of detection in paper chromatography.
4. State the function of scintillator. Give an example.
5. Define reverse dialysis. State one application.
6. Differentiate between TLC and HPTLC.
7. State the basic principle of sedimentation and write the association equation.
8. Define fluorescence. What is the principle behind it ?
9. Define 2D electrophoresis.
10. Elaborate SDS. State its significance.
11. Give two example for dyes used to detect proteins and nucleic acids in electrophoresis.
12. Define radius of rotation. Comment on its proportionality to RPM.

(8 × 3 = 24 marks)

Section B*Answer at least five questions.**Each question carries 5 marks.**All questions can be attended.**Overall Ceiling 25.*

13. Briefly explain the principle of gel chromatography using a figure. Give two applications.
14. Schematically represent the principle of ion exchange chromatography.

Turn over

15. Give a brief note on principle and instrumentation of colorimeter.
16. Explain principle and application of RIA.
17. Brief on the different types of centrifuges.
18. Diagrammatically represent instrumentation of HPLC.
19. Explain the instrumentation of spectrofluorimeter.

(5 × 5 = 25 marks)

Section C

*Answer any **one** question.
The question carries 11 marks.*

20. Describe the principle procedure and application of immunoelectrophoresis.
21. Elaborate on the principle procedure and application of GLC.

(1 × 11 = 11 marks)

**THIRD SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021**

Biochemistry

BCH 3C 03—BIOCHEMISTRY—III

(2014—2018 Admissions)

Time : Three Hours

Maximum : 64 Marks

Part A

Answer all questions.

Each question carries 1 mark.

1. The $1/V$ vs $1/[S]$ plot is also known as _____.
2. The zymogen form of trypsin is _____.
3. Name the two amino acids which are not substrates for gluconeogenesis.
4. Write the expansion for RUBISCO.
5. Name the enzyme that catalyses the last irreversible step in glycolytic cycle.
6. Give an example of a high energy compound.
7. Name the products obtained from non-cyclic photophosphorylation.
8. Name the class of enzymes to which transaminases belong.
9. Name the primer involved in glycogenesis.
10. Name the products of light reaction of photosynthesis.

(10 × 1 = 10 marks)

Part B (Short Answer Type)

Answer any seven questions.

Each question carries 2 marks.

11. Define active site of an enzyme.
12. What is meant by geometrical specificity of enzymes ? Give an example.
13. What is gluconeogenesis ?
14. Why is pyruvate converted to lactate ?

15. What is meant by amphibolic nature of TCA cycle ?
16. What is RUBISCO ?
17. What are coenzymes ? Give any *two* examples.
18. How does pyruvate undergo decarboxylation ?
19. Give two examples of substrate level phosphorylation.
20. List out the different complexes involved in electron transport chain.

(7 × 2 = 14 marks)

Part C (Paragraph Type)

*Answer any four questions.
Each question carries 5 marks.*

21. Explain the effect of substrate concentration on enzyme activity.
22. Draw the Line weaver Burk plot for non-competitive inhibition.
23. Write about the different fates of pyruvate after glycolysis.
24. Write down the sites of ATP formation in electron transport chain.
25. Differentiate between cyclic and non-cyclic photophosphorylation.
26. Explain the role of hormones in glycogen metabolism.

(4 × 5 = 20 marks)

Part D (Essay Type)

*Answer any two questions.
Each question carries 10 marks.*

27. Give a detailed account of digestion and absorption of carbohydrates.
28. Discuss in detail Glycogen metabolism.
29. Give a detailed account of different type of enzyme inhibition
30. Give a detailed account of Calvin Cycle.

(2 × 10 = 20 marks)

**THIRD SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021**

Biochemistry

BCH 3B 04—ENZYMOLGY

(2014—2018 Admissions)

Time : Three Hours

Maximum : 80 Marks

Section A

*Answer all the questions.
Each question carries 1 mark.*

- Which of the following is an example of a ribozyme ?
 - Hexokinase.
 - RNAase H.
 - RNAse P.
 - tRNA.
- Protein part of an enzyme is called _____.
 - Coenzyme.
 - Holoenzyme.
 - Apoenzyme.
 - Cofactor.
- Which of the following is the cofactor for carboxylase enzyme ?
 - TPP.
 - Biotin.
 - PLP.
 - Lipoid acid.
- Pyruvate dehydrogenase complex produce which the following reducing agent ?
 - NADH, H⁺.
 - NADPH, H⁺.
 - FADH₂.
 - FMNH₂.
- Kinase enzyme and polymerase enzyme usually use which of the following metal for catalysis ?
 - Ca²⁺.
 - Na⁺.
 - K⁺.
 - Mg⁺.
- Which of the following statements is not correct related to enzyme ?
 - Enzyme can accelerate the rate of a reaction.
 - Enzyme can decrease the activation energy barrier.
 - Enzymes are stereospecific.
 - Enzymes can decrease the rate constant of a reaction.

Turn over

7. LDH is an example of which class of enzyme ?
- (a) Oxidoreductase. (b) Hydrolase.
(c) Lyase. (d) Ligase.
8. K_m value is an affinity indicator in enzyme catalysed reaction. Which of the following equation represent K_m ?
- (a) K_{-1}/K_{+1} . (b) K_{+1}/K_{-1} .
(c) K_{+2}/K_{+1} . (d) K_{+1}/K_{+2} .
9. Which of the following statements is correct in noncompetitive inhibition ?
- (a) K_m decreases V_{max} decreases. (b) K_m increases V_{max} increases.
(c) K_m no change V_{max} decreases. (d) K_m increases V_{max} no change.
10. According to Michaelis Menten equation at very high substrate concentration, which of the following equation represent the rate of a reaction :
- (a) $V_0 = V_{max} [S]/K_m + [S]$. (b) $V_{max} = K_{+2}[E_T]$.
(c) $V_0 = K_{+2}[E_T]$. (d) $V_{max} = [S]/K_m + [S]$.
11. Which of the following inhibitors is competitive inhibitor of dihydrofolate reductase (DHFR) enzyme ?
- (a) Pencillin. (b) Sulfadruugs.
(c) Methotrexate. (d) Chloramphenicol.
12. Which of the following is an allosteric inhibitor of ATCase ?
- (a) Glucose. (b) ATP.
(c) Fructose. (d) CTP.
13. An enzyme used for the preparation of maltose syrup is :
- (a) Alpha amylase. (b) Papain.
(c) Chymotrypsin. (d) Pepsin.
14. Which of the following is a metalloenzyme ?
- (a) Cytochrome oxidase. (b) Lipase.
(c) Trypsin. (d) Amylase.
15. Prosthetic group is a part of holoenzyme which is _____.
- (a) Loosely attached organic part.
(b) Loosely attached inorganic part.
(c) Firmly attached accessory nonprotein substance.
(d) None of the above.

16. Enzyme catalyzing rearrangement of atomic groups without altering molecular weight or number of atoms is _____.
- (a) Hydrolase. (b) Isomerase.
(c) Oxidoreductase. (d) Ligases.

(16 × 1 = 16 marks)

Section B

Answer any **eight** questions.
Each question carries 3 marks.

17. Distinguish between ribozymes and abzymes.
18. Name the subclasses of transferases.
19. Distinguish between IU and katal.
20. Write briefly on Lineweaver Burk plot for single substrate enzyme catalysed reaction.
21. Write notes on stereochemical specificity of enzyme with an example.
22. Write functions of NAD, FAD and pyridoxal phosphate with each example.
23. Comment on allosteric enzymes.
24. Name three methods of immobilisation of enzymes.
25. What is an active site of an enzyme? Give its characteristics.
26. Enzyme commission number (E.C number) of an enzyme is 2.5.1.1. What do these digits denote ?

(8 × 3 = 24 marks)

Section C

Write a paragraph each on any **four** of the following.
Each question carries 5 marks.

27. Antibiotic inhibitors of enzymes.
28. The purification of enzyme by affinity chromatography.
29. Reversible covalent modification of an enzyme with phosphorylation as an example.
30. Quantitative expression of enzyme activity.
31. Industrial applications of enzymes.
32. Effect of pH on velocity of enzyme catalysed reaction.

(4 × 5 = 20 marks)

Turn over

Section D

Answer any two questions.

Each question carries 10 marks.

33. Briefly describe derivation of Michaelis- Menten equation and significance of K_m and V_{max} .
34. Discuss the classification and of nomenclature of enzymes.
35. Explain different types of enzyme inhibition.

(2 × 10 = 20 marks)

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**THIRD SEMESTER (CUCBCSS-UG) DEGREE EXAMINATION
NOVEMBER 2021**

Biochemistry

BCH 3B 03—TECHNIQUES IN BIOCHEMISTRY

(2014—2018 Admissions)

Time : Three Hours

Maximum : 80 Marks

Section A

Answer the questions in one word or phrase.

Each question carries 1 mark.

1. Name the basic apparatus used for tissue homogenisation.
2. Solvent extraction is based on the relative _____ of the solute.
3. Which is the technique used for concentrating the macromolecules in a solution ?
4. Which technique was primarily used for separating pigments ?
5. In TLC, the stationary phase is _____.
6. In HPLC, 'P' stands for _____.
7. Electrophoresis is used to separate _____ particles.
8. In PAGE, 'A' stands for _____.
9. In SDS PAGE, separation is based on _____.
10. In isopycnic centrifugation, separation is based solely on _____ of the particles.
11. Repeated centrifugations are done in _____ centrifugation.
12. A colorimeter is used to measure _____ of colour.
13. The concentration of suspended particles are measured using _____.
14. Ionising radiations are detected and measured using _____.
15. Which is the *vitro* assay that measures the presence of an antigen with very high sensitivity ?
16. The pattern of decay emissions from a distribution of a radioactive substance is obtained in _____.

(16 × 1 = 16 marks)

Turn over

Section B

*Answer any **eight** questions.
Each question carries 3 marks.*

17. Give a short account on salting out.
18. What is lyophilisation ? What are the advantages of it ?
19. What is the principle of affinity chromatography ?
20. What are the applications of GLC ?
21. Give a short account on zone electrophoresis.
22. Explain the theory of isoelectric focussing.
23. Write the equation for centrifugal force and explain the relation between the parameters.
24. Write a short note on the different centrifuge rotors.
25. Give a short account on antigen antibody reactions.
26. What is a GM Counter ?

(8 × 3 = 24 marks)

Section C

*Answer any **four** questions.
Each carries 5 marks.*

27. Describe the various types of tissue homogenisation.
28. Give short note on immunoelectrophoresis.
29. Give a brief account on partition chromatography.
30. Describe the working and applications of ultracentrifuge.
31. Explain the working of atomic absorption spectrophotometer.
32. Write short notes on Autoradiography.

(4 × 5 = 20 marks)

Section D

*Answer any **two** questions.*

Each carries 10 marks.

33. What is the basic principle of chromatography ? Explain the experimental set up of Ion exchange and gel filtration chromatography.
34. Explain the theory of electrophoresis. Outline the experimental set up of PAGE. How is it different from SDS PAGE ?
35. Write an essay on the principle and instrumentation of Colorimetry and Spectrophotometry.

(2 × 10 = 20 marks)

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