

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2020

(CCSS)

M.Sc. Biochemistry

BCH 2C 01—ENZYMES : KINETICS, MECHANISMS AND REGULATION

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Section A*Answer all questions in two or three sentences.**Each question carries 2 marks.*

1. What active site of an enzyme ?
2. Give the importance of K_m .
3. State Michaelis Menten equation.
4. What is energy of activation ? Give its significance.
5. Give the significance of transition state theory.
6. What are multi-substrate reactions and give its significance?
7. What is K_i and give its significance.
8. How proximity and orientation affect enzyme activity ?
9. What is concerted mechanism ?
10. What are abzymes ?
11. What is zymogen activation, give examples ?
12. How double displacement reaction is taking place ? Give example.
13. Give the significance of transition state analogues.
14. Name the catalytic triad amino acids of chymotrypsin.
15. What are metalloproteinases ? Give examples.
16. Give the significance of Isozymes.
17. Name the different forms of lactate dehydrogenase and its distribution.
18. What is Irreversible inhibition ? Give its application.

Turn over

19. State the role of ATP and CTP on aspartate transcarbamoylase.
20. What is positive co-operativity ?

(20 × 2 = 40 marks)

Section B

Answer any five questions.

Each question carries 8 marks.

21. Give the principle, instrumentation and applications of SDS PAGE.
22. Give the principle, instrumentation design and applications of ion exchange chromatography.
23. Describe the applications and hazards of radioactivity and precautions to be taken.
24. Describe how immunoblotting is used to confirm the presence of a particular protein ?
25. Explain the working and instrumentation for PH meter.
26. Describe, how will you differentiate a competitive inhibition from a non-competative inhibition.
27. Describe the principle, methodology and applications of Scanning Electron Microscopy.

(5 × 8 = 40 marks)

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2020

(CCSS)

M.Sc. Biochemistry

BCH 2C 03—BIostatISTICS AND BIOINFORMATICS

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Part A*Answer all questions in 2 or 3 sentences each.**Each question carries 2 marks.*

1. What do you mean by standard error ?
2. What is a network ? Differentiate between WAN and LAN.
3. Define variable.
4. What are the biological motivations to do sequence alignment ?
5. Write notes on Student's t test.
6. Differentiate between pair wise alignment and multiple sequence alignment.
7. What is histogram ?
8. Mention the merits of mean as a better measure of central tendency.
9. What do you infer from the P value ?
10. Differentiate between mode and median.
11. What is the application of Clustal ?
12. What is the use of Phylip ?
13. What do you mean by progressive alignment ?
14. Define molecular docking.
15. How is the structure of molecules stored in Protein Data Bank (PDB) ?
16. What are the general methods collecting data for biostatistical analysis ?

17. How is the structure of molecules stored in Protein Data Bank (PDB) ?
18. How is genome sequences assembled ?
19. Define a scoring matrix.
20. What is gap penalty ?

(20 × 2 = 40 marks)

Part B

Write notes on any five of the following.

Each question carries 8 marks.

21. Write an essay on evolutionary analysis.
22. Describe various methods for the prediction of structures.
23. Give an account of various biological data formats.
24. Give an account of regression analysis.
25. Give an account of biological databases.
26. Explain briefly FASTA algorithm. What are the basic differences between FASTA and BLAST ?
27. Give an account of different tests of significance.

(5 × 8 = 40 marks)

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2020

(CCSS)

M.Sc. Biochemistry

BCH 2C 02—CELL BIOLOGY AND CELL SIGNALING

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Section A*Answer all questions in two or three sentences.**Each question carries 2 marks.*

1. How and which stage of cell cycle is regulated by Rb and p53 genes ?
2. How are proteins targeted for degradation by proteasomes ?
3. Name D cyclins associate with the early G1 phase.
4. State the activity of transglutaminase.
5. Comment on the function of homeotic genes.
6. Name a protein serves to inhibit apoptosis and state its role.
7. How does sirtuin gene prevent aging ?
8. Write down two facilitator receptor of phagocytosis.
9. Name any *four* microbicidal agents in human system.
10. Mention the role desaturases and phospholipases in maintaining membrane fluidity.
11. Differentiate voltage and ligand gated channels.
12. What is cause of loss of water due to plasmolysis.
13. What are cell junctions ? Give function of any *two* types of cell junctions ?
14. Mention the activities of the kinetochore during mitosis.
15. Name two RTKs activators.
16. Differentiate ligand-mediated and receptor-mediated dimerization.

17. Mention the role IP3 as second messenger.
18. List out four hormones that induced production of cAMP in mammalian cells.
19. State two each of physiological response and associated disorder mediated by GPCR.
20. Give structural significance of G-protein coupled receptor.

(20 × 2 = 40 marks)

Section B

*Answer any five questions.
Each question carries 8 marks.*

21. Explain structural and functional role of anaphase promoting complex.
22. Comment on the mechanism of oxidative stress and ageing.
23. Compare the four basic mechanisms that a substance can move across the plasma membrane.
24. Elaborate the genetic control of embryonic development.
25. Contrast the roles of ion pumps and channels in nerve cells.
26. Comment on the role of Ras proteins in signal transmission.
27. Explain briefly on extracellular messengers.

(5 × 8 = 40 marks)

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2021

(CCSS)

Biochemistry

BCH 2C 03—BIOSTATISTICS AND BIOINFORMATICS

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Part A*Answer all questions in 2 or 3 sentences each.**Each question carries 2 marks.*

1. What do you mean by range in statistics ?
2. What is Correlation ?
3. Briefly describe the applications of EMBOSS.
4. Name any *two* BLAST versions and describe their applications.
5. Differentiate between global alignment and local alignment.
6. What is gap penalty ?
7. What is a Network ? Differentiate between WAN and LAN.
8. Define Variable.
9. Expand and explain what is HTTP ?
10. Define molecular docking.
11. What is a secondary database ? Give examples.
12. What do you mean by multiple sequence alignment ?
13. What do you mean by standard deviation ?
14. Write notes on Student's t test.
15. What is meant by classification ?
16. What does genome assembly mean ?

17. What are the general methods of collecting data for biostatistical analysis ?
18. What are the applications of Phylip package ?
19. Write notes on FASTA tool.
20. What is E value ?

(20 × 2 = 40 marks)

Part B

Write notes on any five of the following.

Each question carries 8 marks.

21. Give an account of biological databases.
22. Briefly describe the applications of data mining.
23. Give an account of the different diagrammatical presentations of statistical data.
24. Write an essay on gene prediction.
25. Give an account of protein modelling and its applications.
26. Write an essay on evolutionary analysis.
27. Write notes on the test for goodness of fit.

(5 × 8 = 40 marks)

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2021

(CCSS)

Biochemistry

BCH 2C 01—ENZYMES : KINETICS, MECHANISMS AND REGULATION

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Section A*Answer all questions in two or three sentences.**Each question carries 2 marks.*

1. Define Unit.
2. What is holoenzyme ?
3. Give the importance of V_{max} .
4. State Michaelis Menten equation.
5. Give the significance of transition state theory.
6. What is specific activity of an enzyme? Give its significance.
7. Comment how a zymogen is activated with suitable example.
8. What is K_i and give its significance.
9. What is metal ion catalysis?
10. Define suicide inhibition?
11. State strain and distortion theory.
12. What is Hill Plot ?
13. Name two therapeutic enzymes ?
14. What is double displacement reaction with example.
15. Name the catalytic triad residues of chymotrypsin.
16. Give the importance of double reciprocal plot

17. Give the significance of Isozymes.
18. How will you interpret Hill co-efficient value 1 ?
19. What is the role of ATP and CTP on aspartate transcarbamoylase ?
20. What is half site reactivity ?

(20 × 2 = 40 marks)

Section B

Answer any five questions.

Each question carries 8 marks.

21. Describe the principle and applications of MALDI TOFMS.
22. Describe the principle, methodology and applications of Scanning Electron Microscopy.
23. Describe different methods of enzyme immobilization.
24. Give a note on isozymes with suitable examples.
25. Discuss allosteric inhibition with suitable example.
26. Give the principle, methodology and applications of Western blotting.
27. Describe the working and instrumentation for PH meter.

(5 × 8 = 40 marks)

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2021

(CCSS)

Biochemistry

BCH 2C 02—CELL BIOLOGY AND CELL SIGNALING

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Section A*Answer all questions in two or three sentences.**Each question carries 2 marks.*

1. How do cyclins modulate the progression of cells through the cell cycle ?
2. Mention the function of ubiquitin.
3. Which protein is act as an anti-apoptotic factor associated with the mitochondria ?
4. Define senescence and name a transcription factor that promotes senescence.
5. State the role of CED4 in apoptosis.
6. How does p53 cause an increase in p21 protein levels ?
7. Name one each of direct and indirect facilitator receptors of phagocytosis.
8. Give two zygotic genes with its role.
9. List out any *four* microbicidal agents in human system.
10. Why do integral proteins is called transmembrane proteins ?
11. Mention the importance of membrane fluidity.
12. How do mechano gated channels different from voltage-gated channels ?
13. Define plasmolysis.
14. Differentiate symport and antiport.
15. State the role of TNF molecule in the cell death.
16. Give two examples of mammalian proteins activated by Ca^{2+} .

17. Mention the structure of receptor protein-tyrosine kinases.
18. State the mechanism of formation of the second messenger IP₃.
19. How do phorbol esters interfere with signal pathways that involve diacylglycerol ?
20. Comments on how same messenger evoke different responses in different target cells ?

(20 × 2 = 40 marks)

Section B

*Answer any five questions.
Each question carries 8 marks.*

21. Briefly write the different checkpoints and regulation of cell cycle.
22. Describe the theories of aging.
23. Elaborate the cascade of gene expression pathways for control of development of a segmental body pattern of the fruit fly.
24. Comment on the role of the formation of caspase-containing complexes in the process of apoptosis.
25. Describe the fluid mosaic model of plasma membrane.
26. List characteristics that distinguish between a hemidesmosome and a focal adhesion.
27. Explain the steps of a generalized MAP kinase cascade.

(5 × 8 = 40 marks)

**SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2021**

(CBCSS)

Biochemistry

BCH 2C 01—ENZYMOLGY

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend **all** questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Part A (Short Answers)

*Answer any **four** questions.*

Each question carries 2 weightage.

1. Write the mechanism of action of sulpha drugs.
2. What are therapeutic enzymes ? Give two examples.
3. Define transition state and energy of activation.
4. Write down the bond specificity of trypsin and chymotrypsin.
5. What is meant by active site mapping ?
6. Give the chemical structure of the coenzyme form of niacin.
7. What are Endonucleases ? Give two examples.

(4 × 2 = 8 weightage)

Part B (Short Essays)

*Answer any **four** questions.*

Each question carries 3 weightage.

8. Write down the properties and significance of isoenzymes with a suitable example.
9. How are multi-substrate reactions classified ?

Turn over

10. Write about the role of metal ions or metal cofactors in enzymes.
11. List out the characteristic features of K_m value of an enzyme.
12. Explain ping-pong mechanism.
13. Write about concerted and sequential model of allosteric enzyme regulation.
14. What are immobilized enzymes ? Mention its application.

(4 × 3 = 12 weightage)

Part C (Long Essays)

*Answer any **two** questions.*

Each question carries 5 weightage.

15. Discuss in detail the different types of enzyme inhibition.
16. Give a detailed account of different mechanisms of enzyme action.
17. Discuss about the applications of enzymes in genetic engineering and biotechnology.
18. Explain the properties, mechanism and regulation of a multienzyme complex.

(2 × 5 = 10 weightage)

**SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2021**

(CBCSS)

Biochemistry

BCH 2C 02—PLANT BIOCHEMISTRY

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend **all** questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Part A (Short Answers)

*Answer any **four** questions.*

Each question carries 2 weightage.

1. What are photosystems ?
2. Explain the term biological clock.
3. What are plant toxins ?
4. Explain the chemical nature of nicotine.
5. Comment on isoprene rule.
6. What are the functions of plant secondary metabolites in plants ?
7. Discuss on the significance of glutathione.

(4 × 2 = 8 weightage)

Part B (Short Essays)

*Answer any **four** questions.*

Each question carries 3 weightage.

8. Explain the C2 and C3 pathways.
9. Discuss on the stress acclimatization in plants.

Turn over

10. Write a short note on nitrogen fixation.
11. Discuss on the ammonium assimilation enzymes in plants.
12. Give an outline on phenols.
13. Write down the applications of secondary metabolites as natural pesticides.
14. Outline the carbon cycle.

(4 × 3 = 12 weightage)

Part C (Long Essays)

*Answer any **two** questions.*

Each question carries 5 weightage.

15. Briefly outline the structure, organisation and composition of chloroplast membrane.
16. Describe the structure, function and mechanism of action of phytochromes and cryptochromes.
17. Discuss in detail, the chemistry, classification and functions of terpenoids.
18. Explain the diverse mechanisms of Xenobiotic metabolism in plants.

(2 × 5 = 10 weightage)

**SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2021**

(CBCSS)

Biochemistry

BCH 2C 03—CELL AND MOLECULAR BIOLOGY

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend all questions in each section.*
2. *The minimum number of questions to be attended from the Section/Part shall remain the same.*
3. *There will be an overall ceiling for each Section/Part that is equivalent to the maximum weightage of the Section/Part.*

Part A (Short Answers)

Answer any four questions.

Each question carries 2 weightage.

1. Briefly comment on the function of ubiquitin proteasome system.
2. What is CED9 ?
3. Give the structural organization of Clathrin.
4. What is meant by second messenger ?
5. Identify the upstream and downstream signalling molecules of MAP Kinase.
6. Why is lagging strand discontinuous in replication ?
7. What is a primary transcript ?

(4 × 2 = 8 weightage)

Part B (Short Essays)

Answer any four questions.

Each question carries 3 weightage.

8. Give an account of the genetic control of Drosophila embryonic development.
9. Explain the events in apoptosis.

Turn over

10. Comment on the types of cell junctions.
11. Discuss the mechanism of signal transmission by Ras proteins.
12. Differentiate between Rho dependent and Rho independent termination.
13. What are Transposons ? Explain their role.
14. Give an account of mechanisms of gene regulation in Eukaryotes.

(4 × 3 = 12 weightage)

Part C (Long Essays)

Answer any two questions.

Each question carries 5 weightage.

15. Explain in detail the cell cycle checkpoints and their mechanism of regulation.
16. Explain the different mechanisms of membrane transport and their functioning.
17. Give a detailed account of the events and regulation of DNA replication in *E. coli*.
18. Explain in detail the mechanism of translation in Eukaryotes and its regulation.

(2 × 5 = 10 weightage)