

This question paper contains **3** printed pages|

09/6/25

Roll No.

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S. No. of Question Paper : **5293**

Unique Paper Code : **2494001203**

Name of the Paper : **Techniques in Biochemistry**

Name of the Course : **B.Sc. (Hons.) Biochemistry (NEP)**

Semester : **II**

Duration : **2 Hours**

Maximum Marks : **60**

(Write your Roll No. on the top immediately on receipt of this question paper.)

There are *six* questions.

Attempt *four* questions in all.

All questions carry equal marks.

Question No. **1** is compulsory.

1. (a) Explain the following terms :

- (i) Electromagnetic spectrum
- (ii) Svedberg coefficient
- (iii) Electrophoretic mobility
- (iv) Salting out
- (v) Native gel
- (vi) Chromatography.

P.T.O.

- (b) Briefly describe the contribution of the following scientists :
- (i) Antonin Prandtl
 - (ii) Arne Tiselius
 - (iii) Mikhail Tsvet. 12,3
2. (a) Define the working of double beam UV-visible spectrophotometer with suitable diagrams.
- (b) Discuss the working principle and application of paper chromatography. 8,7
3. (a) Briefly describe the principle of centrifugation and different factors affecting it and discuss the various types of centrifuges.
- (b) What is the role of Ethidium bromide, TEMED, stacking gel and bromophenol blue in the process of electrophoresis ?
- (c) What is hypsochromic, hyperchromic and hypochromic shifts ? 8,4,3
4. Write short notes on the following :
- (a) Cell lysis methods
 - (b) Factors affecting the migration of DNA in agarose gel electrophoresis
 - (c) Types of rotors. 5×3
5. (a) Give a brief overview of Lambert-Beer law and its limitations.
- (b) Explain the importance of molecular sieve chromatography.

- (c) A mixture of three amino acids was analyzed with paper chromatography. The paper is extensively hydrated. The solvent system is *n*-propanol : water (70:30 ratio). Predict the order of mobility of these three amino acids on the chromatogram and draw it. i.e. low to high R_f of the three amino acids, given that they are Aspartic acid, Alanine and Phenylalanine (mentioned here in the order of decreasing polarity). 6,5,4
6. Differentiate between the following :
- (i) Ion exchange and affinity chromatography
 - (ii) Density gradient and differential centrifugation
 - (iii) PAGE and AGE. 5×3

This question paper contains 3 printed pages]

June 2021

Roll No.

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S. No. of Question Paper : 5770

Unique Paper Code : 2492011201

Name of the Paper : Enzymes

Name of the Course : B.Sc. (Hons.) Biochemistry (NEP)

Semester : II

Duration : 2 Hours

Maximum Marks : 60

(Write your Roll No. on the top immediately on receipt of this question paper.)

There are six questions.

Attempt any four questions.

All questions carry equal marks.

Question No. 1 is compulsory.

1. (A) Comment on the following statements :

- (i) Covalently bound cofactors are classified as prosthetic groups.
- (ii) Creatine kinase used in clinical diagnosis.
- (iii) A purified enzyme has maximum specific activity.
- (iv) Enzymes lowers the activation energy of a reaction to speed up the reaction rate.
- (v) Competitive inhibition is a reversible form of enzyme inhibition.
- (vi) K_{cat}/K_m ratio used as a measure of catalytic efficiency.

P.T.O.

(B) Give a suitable example for each of the following :

(i) Metalloenzyme

(ii) Ribozyme

(iii) Therapeutic enzyme.

12,3

2. (A) Explain the following types of inhibition using Lineweaver-Burk plots :

(i) Competitive inhibition

(ii) Mixed inhibition

(iii) Uncompetitive inhibition.

What effect does these above-mentioned inhibitors have on K_m and V_{max} ?

(B) Describe the enzyme regulation by covalent medication with the help of a suitable example.

9,6

3. Differentiate between the following :

(i) Lock and key and Induced fit hypothesis of enzyme catalysis

(ii) Discontinuous and Continuous enzyme assays

(iii) Eadie-Hofstee and Hanes plots

(iv) Single displacement and double displacement bisubstrate reactions.

3,4,4,4

4. (A) Explain how are enzymes classified ? Give suitable examples.

- (B) For an enzyme catalyzed reaction, if $k_{\text{cat}} = 600\text{s}^{-1}$, $[E_t] = 20\text{nM}$ and $V_o = 9.6 \mu\text{Ms}^{-1}$. Calculate V_{max} and K_m when $[S] = 40\mu\text{M}$.
- (C) Explain the allosteric regulation of ATCase enzyme. 7,3,5
5. (A) Explain general acid-base and covalent catalytic mechanism of enzyme action with suitable example.
- (B) Derive Michaelis-Menten equation. Under what condition is $K_m = [S]$?
- (C) Write the role of enzymes in research. Explain with *two* examples. 6,6,3
6. (A) Explain the role of the following coenzymes in enzyme-catalysed reactions with examples :
- (i) TPP
 - (ii) NAD.
- (B) Write short notes on the following :
- (i) Immobilized enzymes
 - (ii) Isoenzymes
 - (iii) Zymogens. 6,9

This question paper contains 4 printed pages]

17/6/25 ✓

Roll No.

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S. No. of Question Paper : 5791

Unique Paper Code : 2492011202

Name of the Paper : Metabolism of Carbohydrates

Name of the Course : B.Sc. (Hons.) Biochemistry (NEP)

Semester : II

Duration : 2 Hours

Maximum Marks : 60

(Write your Roll No. on the top immediately on receipt of this question paper.)

There are six questions.

Attempt any four questions.

All questions carry equal marks.

Question No. 1 is compulsory.

1. (A) Justify the following statements :

- (i) Glycogenin is the primer involved in glycogen synthesis.
- (ii) Intermediates of glycolysis are not able to leave the cells in which they are formed.
- (iii) Metabolic pathways are irreversible.
- (iv) Liver glycogen contributes to blood glucose but not muscle glycogen.
- (v) Lactate accumulation takes place in muscles during strenuous exercise.
- (vi) Glucose-6-phosphate dehydrogenase deficient persons show resistance to malarial parasite.

P.T.O.

(B) Give the reaction for the following :

- (i) Committed step of glycolysis
- (ii) Reaction catalyzed by Branching enzyme
- (iii) Reaction involved in substrate level phosphorylation in TCA cycle
- (iv) Conversion of galactose 1-phosphate to glucose 1-phosphate
- (v) Reaction catalyzed by phosphoglucomutase
- (vi) Conversion of pyruvate to phosphoenol pyruvate. 9,6

2. (A) Why does glycolysis and gluconeogenesis not occur simultaneously ?
Explain the reciprocal regulation of glycolysis and gluconeogenesis with respect to PFK I and PFK II.

(B) Give the biochemical basis and symptoms of the following diseases
(any *four*) :

- (i) Von Gierkés
- (ii) Cori disease
- (iii) Pompe disease
- (iv) McArdle disease
- (v) Lactose intolerance. 7,8

3. (A) Explain why ATP is the most suitable form of energy currency in the cell.

(B) Differentiate between the following :

- (i) Autotrophs and Heterotrophs
- (ii) Lactate fermentation and alcohol fermentation
- (iii) Hexokinase and Glucokinase
- (iv) Oxidative phosphorylation and substrate level phosphorylation

3,12

4. (A) What is the significance of Pentose Phosphate Pathway ? Describe the fate of glucose-6-phosphate when the need for NADPH exceeds that of ribose 5-phosphate.

(B) Describe how increased level of the following molecules will affect the glycolysis rate ?

- (i) Increased level of F-6-P
- (ii) Increased ATP
- (iii) Increased Citrate.

(C) Write down the reactions affected by the following inhibitors/drugs :

- (i) Arsenate
- (ii) Fluoride
- (iii) Iodoacetate
- (iv) Malonate.

5,6,4

Write short notes on the following :

(i) Cori cycle

(ii) Anaplerotic reactions

(iii) Regulation of Pyruvate Dehydrogenase complex

(iv) Any *two* feeder pathways for glycolysis

4,3,4,4

6. (A) What are the advantages of storing glucose in the form of glycogen ? How does the glycogen breakdown occur under hypoglycemic conditions ?

(B) Describe in detail the role of *three* enzymes and give coenzymes involved in the conversion of pyruvate to acetyl CoA by Pyruvate dehydrogenase complex.

(C) TCA cycle provides substrate for several biosynthetic processes. Justify.

6,5,4

This question paper contains **3** printed pages]

June 2025

Roll No.

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S. No. of Question Paper : **5811**

Unique Paper Code : **2492011203**

Name of the Paper : **Basic Concepts of Cell Biology**

Name of the Course : **B.Sc. (Hons.) Biochemistry (NEP)**

Semester : **II**

Duration : **2 Hours**

Maximum Marks : **60**



(Write your Roll No. on the top immediately on receipt of this question paper.)

There are *six* questions.

Attempt any *four* questions.

All questions carry equal marks.

Question No. **1** is compulsory.

1. (a) State True or False and justify your answer :

- (i) Chloroplast is also called a semi-autonomous organelle.
- (ii) Glycosylation of proteins takes place in only endoplasmic reticulum.
- (iii) Lysosomal enzymes function at neutral pH.
- (iv) Microfilaments play a major role in nutrient absorption.
- (v) Integrins are important components of cell membrane.
- (vi) Emerin is located on inner membrane of mitochondria.

P.T.O.

- (b) Define the following :
- (i) MTOCs
 - (ii) Formin
 - (iii) Focal adhesion
 - (iv) Lysosomal storage disease. 9,6
2. (a) Describe briefly the polymerization and organization of microtubules.
- (b) Draw a well labelled diagram of mitochondria and write down its functions.
- (c) Describe briefly on histochemical staining techniques. 6,5,4
3. Differentiate the following :
- (i) Mitosis and meiosis
 - (ii) Desmosomes and hemidesmosomes
 - (iii) Pinocytosis and phagocytosis. 5,5,5
4. (a) Describe the structure of light microscope and elaborate on its working principle.
- (b) Explain the transport of proteins to nucleus.
- (c) Draw a well labelled diagram of nuclear pore complex. 6,5,4

5. Write short notes on the following :
- (i) Biogenesis and functions of peroxisomes
 - (ii) Actin binding proteins
 - (iii) Protein glycosylation in endoplasmic reticulum. 6,5,4
6. (a) Describe briefly structure, assembly and functions of intermediate filaments.
- (b) Describe briefly structure and functions of cell matrix proteins with at least *two* suitable examples.
- (c) Elaborate on connexin proteins and plasmodesmata with the help of diagrams. 6,5,4