

Total No. of Questions : 10]

SEAT No. :

[Total No. of Pages : 3

PE4529

[6511]-1

M.Sc. - I

BIO - CHEMISTRY

CHB-501-MJ : Biomolecules

(2023 Credit Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 and Q.6 are compulsory.*
- 2) *Attempt any three questions from question 2 to question 5.*
- 3) *Attempt any three questions from question 7 to question 10.*
- 4) *Use separate answer sheets for both sections.*
- 5) *Figures to the right indicate full marks.*

SECTION - I

Q1) Answer the following.

[5]

- a) Write the structure of α -D glucose.
- b) What is basic composition of living matter.
- c) List deficiency symptoms of 'Vitamin C'.
- d) Elaborate the term 'Liposomes'.
- e) Write the significances of carbohydrates.

Q2) a) Answer the following questions.

[10]

i) Define the term coenzyme? Give any three examples of coenzymes. **[3]**

ii) How Vitamins are classify? Give examples. **[3]**

b) Answer the following questions.

i) Elaborate the structure of 'water' molecule. **[2]**

ii) How 'Micelle' is formed? **[2]**

P.T.O.

- Q3)** Write short notes on the following. **[10]**
- a) Glycolipids
 - b) Amino sugars
 - c) Rancidity
 - d) Significances of phospholipids
 - e) Epimers
- Q4)** a) Answer the following questions. **[10]**
- i) Define fatty acids. With the help of examples. Explain how fatty acids are classified? **[3]**
 - ii) What are polysacchrids? How they are classified? Give examples. **[3]**
- b) Attempt the following questions.
- i) Write the structure of α -D. Maltose and β -D.Maltose. **[2]**
 - ii) Write short account on Vitamin A. **[2]**
- Q5)** Answer the following questions (Any Two) **[10]**
- a) Define and classify Monosacchrides with examples.
 - b) With the help of Benedicts reaction explain why sucrose is Non - Reducing sugar.
 - c) What are Lipo-proteins? How they are classified? Give functions of each class.
- SECTION - II**
- Q6)** Answer the following questions. **[5]**
- a) How proteins are classify on the basis of shape? Give example.
 - b) What are rare amino acids?
 - c) Write the structure of Tyrosine.
 - d) What are nucleosides?
 - e) Write the structure of purines.
- Q7)** a) Answer the following questions. **[10]**
- i) With the help of diagram explain alpha-helix (α -helix) structure of protein. **[3]**
 - ii) Explain Types of DNA. **[3]**
- b) Attempt the following questions.
- i) What is 'Zwiterion'? **[2]**
 - ii) What do you mean by 'Super secondary structures' of protein?[2]

Q8) Write short note on the following. **[10]**

- a) Peptide bond formation.
- b) Denaturation of protein.
- c) Nucleotides.
- d) Myoglobin structure.
- e) Essential and Non-Essential amino acids.

Q9) a) Answer the following questions. **[10]**

- i) With the help of a diagram explain 'Ramchandran plot'. **[3]**
- ii) Explain Beta pleated sheets of protein structure. **[3]**

b) Answer the following questions.

- i) List the bonds involved in stabilising tertiary structure of protein. **[2]**
- ii) Explain Ninhydrin Reaction. **[2]**

Q10) Write answer of the following questions. (Any Two) **[10]**

- a) Explain titration curve of Glycine. Write its significance.
- b) Elaborate the structure of Haemoglobin.
- c) What is solid phase synthesis? Explain.



Total No. of Questions : 10]

SEAT No. :

[Total No. of Pages : 3

PE4530

[6511]-2

F.Y. M.Sc.

BIOCHEMISTRY

CHB-502-MJ : Enzymology and Biophysical Techniques

(2023 Credit Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 and Q.6 are compulsory and carry 5 marks.*
- 2) *Attempt any three questions from Q.2 to Q.5.*
- 3) *Attempt any three questions from Q.7 to Q.10.*
- 4) *Answers to the both sections should be written on separate answer sheets.*
- 5) *Figures to the right indicate full marks.*

SECTION - I

(Enzymology)

Q1) Answer any five of the following : **[5]**

- a) What type of reactions are catalysed by isomerase class of enzymes?
- b) What do you mean by biocatalyst?
- c) What is a rate limiting step in enzyme catalysed reaction?
- d) Discuss $V_{\max}$ in an enzyme catalysed reaction.
- e) In which class of enzymes NAD is an important co-factor?
- f) Give difference between prosthetic group and coenzymes.

Q2) Answer the following :

- a)
 - i) Explain effect of inhibitor in an enzyme catalysed reaction. **[3]**
 - ii) Explain ping pong mechanism for two substrate reaction. **[3]**
- b)
 - i) Discuss strain and distortion effect of enzyme catalysed reaction. **[2]**
 - ii) An enzyme hydrolysed a substrate concentration of 0.03mmol/L, the initial velocity was 1.5×10^3 mmol/L·min⁻¹ and maximum velocity was 4.5×10^{-3} mmol/L·min⁻¹. Calculate K_m value. **[2]**

P.T.O.

Q3) Write short notes on (Any five) : **[10]**

- a) Cofactors
- b) Uncompetitive inhibition
- c) Adair equation
- d) Allosteric inhibition
- e) Lock and key hypothesis
- f) Enzyme classification

Q4) Solve the following :

- a) i) Why is the side chain of ser-195 especially reactive in chymotrypsin? **[3]**
ii) Derive Michaelis Menten equation. **[3]**
- b) i) Explain effect of pH in a enzyme catalysed reaction. **[2]**
ii) Discuss M.W.C. model. **[2]**

Q5) Attempt any two of the following : **[10]**

- a) Comment on methods for measurement of rates of K_s & K_d of enzyme turnover.
- b) Explain covalent catalysis with example.
- c) What is presteady state kinetics? Explain stopped flow method.

SECTION - II

(Biophysical Techniques)

Q6) Answer the following (Any five) : **[5]**

- a) Why is sample buffer used in PAGE?
- b) How many phases does paper chromatography have?
- c) What materials are used in ion exchange?
- d) Why is it necessary to purify proteins?
- e) How is molecular weight determined by gel chromatography?
- f) Why is bromophenol blue used in SDS PAGE?

Q7) Answer the following :

- a) i) Why is polyacrylamide used instead of agarose? [3]
- ii) What is the principle of GLC? [3]
- b) i) Why is agarose a preferred medium for electrophoresis? [2]
- ii) What is the principle of protein precipitation? [2]

Q8) Write short notes on (any five) : [10]

- a) Moving boundary electrophoresis
- b) Fibre glass filters
- c) HPLC
- d) Monochromator
- e) Properties of ion exchanger
- f) Light source of spectrophotometer

Q9) Solve the following :

- a) i) How is immobilization of ligand performed in affinity chromatography? [3]
- ii) Write the advantages of Ion exchange chromatography. [3]
- b) i) What is the difference between SDS-PAGE and isoelectric focusing? [2]
- ii) How to extract membrane-bound proteins? [2]

Q10) Attempt any two of the following : [10]

- a) Discuss the principle of disc electrophoresis.
- b) Write a short note on gel chromatography.
- c) Explain any two applications of HPLC.



Total No. of Questions : 5]

SEAT No. :

PE4531

[Total No. of Pages : 2

[6511]-3
F.Y. M.Sc.
BIOCHEMISTRY
CHB-503-MJ : Cell Biology
(2023 Credit Pattern) (Semester - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question No. 1 is compulsory.*
- 2) *Attempt any three questions from Q2 to Q5.*
- 3) *Figures to the right indicate full marks.*

Q1) Attempt the following questions. [5]

- a) Write the important functions of xylem & phloem.
- b) Elaborate structure of Mitochondria.
- c) What is stem cell?
- d) List the function of peroxisome.
- e) What is function of Nucleolus?

Q2) a) Answer the following questions. [6]

- i) Explain the process of Meiosis with the help of diagram.
- ii) Describe the functions of lysosome.

b) Answer the following questions. [4]

- i) Draw a labelled diagram of chloroplast. [2]
- ii) What is function of cytoskeleton? [2]

Q3) Write short notes on following. [10]

- a) Fibronectin
- b) Role of Elastin
- c) Cell adhesion molecules
- d) Endoplasmic Reticulum
- e) Lamini

P.T.O.

- Q4)** a) Attempt the following questions. [6]
- i) Differentiate between prokaryotic and eukaryotic cells. [3]
 - ii) Describe the types of vesicles that arise from Golgi membrane. [3]
- b) Attempt the following questions. [4]
- i) Enlist different constituents of nucleus. [2]
 - ii) Cell differentiation. [2]
- Q5)** Answer the following (any two). [10]
- a) Classify fungi? Give its biological importance. [5]
 - b) Write a note on plasma membrane and the transport across plasma membrane. [5]
 - c) Define the term fertilization. Explain its significance. [5]



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE4532

[6511]-4

M.Sc. - I

BIOCHEMISTRY

CHB-505-MJ : Microbiology

(2023 Credit Pattern) (Semester - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Attempt any three questions from Q.2 to Q.5.*
- 3) *Figures to the right indicate full marks.*

Q1) Attempt the following : (Any 5) [5]

- a) Define phototroph with example.
- b) What is difference between antiseptic and sanitizer?
- c) Define mutation and mutagen.
- d) Name the organism involved in alcohol production.
- e) Define acidophiles and basophiles.
- f) What are the types of plasmid?

Q2) a) Write short note on the following. [6]

- i) Phases of bacterial growth curve.
- ii) Microbial production of alcohol.

b) Attempt the following. [4]

- i) Describe replica plate technique.
- ii) Explain the characteristics of microorganisms.

Q3) Write short note on the following (Any 5) : [10]

- a) Nitrogenase complex.
- b) Resistance and immunity.
- c) Streak plate method.
- d) Viroid
- e) TEM
- f) Continuous culture of microorganisms.

P.T.O.

Q4) a) Answer the following : **[6]**

- i) Explain lytic cycle.
- ii) Differentiate between Gram positive and Gram negative bacteria.

b) Attempt the following : **[4]**

- i) Explain bacterial cell structure.
- ii) Write the applications of autoclave.

Q5) Attempt any two of the following : **[10]**

- a) Explain glutamic acid production.
- b) Explain the mechanism of action neurotoxin with example.
- c) Describe production of mutants by physical agent.



Total No. of Questions : 6]

SEAT No. :

[Total No. of Pages : 2

PE4533

[6511]-6

M.Sc. (Part - I)

BIOCHEMISTRY

CHB-508-RM : Research Methodology

(2023 Credit Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve all questions all questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) There is no section calculator are allowed.*

Q1) Answer the following questions :

[10]

- a) Why filtration is use in the laboratory?
- b) Write importants of Lab-coat.
- c) List the extraction solvents used for many solutes.
- d) Write significance of melting point determination.
- e) What is trade secrete?

Q2) Attempt the following questions. (Any two)

[10]

- a) What is SI unit? Give importants of it? Write about seven universally recognised SI units.
- b) Calculate the median for the following frequency distribution.

Marks	frequency
0-10	05
10-20	10
20-30	20
30-40	12
40-50	08

- c) Find the mean of following data.

21, 22, 25, 19, 17, 26, 23, 17, 11, 23.

P.T.O.

Q3) Write short notes on any three: [15]

- a) Trademark
- b) Crystalization
- c) Biological waste management
- d) Copy right
- e) Standard deviation

Q4) Answer the following question. [10]

- a) Find the arithmetic mean (AM) for the following frequency distribution.

Class	F
0-10	02
10-20	05
20-30	20
30-40	03
40-50	02

- b) Write short note on PPE. (Personal Protective Equipments)

Q5) Answer the following questions : [3×5=15]

- a) Find the median for following data.
11, 10, 09, 13, 15
- b) What is Patent? Give important and rights of it?
- c) What is plagiarism? Elaborate your answer with types and important of plagiarism.

Q6) Answer the following questions : [2×5=10]

- a) Write short note on 'Incinerators'.
- b) Write about various methods of heating used in the laboratory.



Total No. of Questions :10]

SEAT No. :

[Total No. of Pages : 3

PE4534

[6511]-21

F.Y.M.Sc.

BIOCHEMISTRY

CHB-551MJ: Bioenergetics and Metabolism

(2023 Credit Pattern) (Semester-II)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question No. 1 (one) and question 6 (six) are compulsory.*
- 2) *Attempt any three (3) questions from question number 2 (two) to question number 5.*
- 3) *Attempt any three (3) question from question number 7 (seven) to question number 10 (ten)*
- 4) *Answer both sections on separate answer sheets.*
- 5) *Figure to the right indiate full marks.*

SECTION-I

Q1) Answer the following.

[5]

- a) Define the term Enthalpy
- b) List the types of fatty acid oxidation
- c) Why TCA is called Amphobolic in nature
- d) Write name of any two inborn error of carbohydrate metabolism
- e) Write the significance of glucuronic acid pathway.

Q2) a) Attempt the following questions.

[6]

- i) What is substrate level phosphorylation? Explain with example
- ii) Explain by-pass reactions of gluconeogenesis with respect to glycolysis

b) Answer the following

[4]

- i) Write the energetics of, saturated fatty acid, palmtic acid undergo complete Beta oxidation
- ii) What are significance of Glycolysis.

P.T.O.

Q3) a) Attempt the following. **[6]**

- i) Write short account on carnitin shuttle with diagram.
- ii) Explain how Glucose molecule is released from Glycogen

b) Answer the following. **[4]**

- i) Give the diagram explaining entry of standard amino acids into TCA cycle
- ii) With the help of example write the function of kinases enzymes

Q4) Write short notes on the following. **[5×2=10]**

- a) Glyoxylate cycle
- b) Fate of pyruvate
- c) Importants of pentose phosphate pathway
- d) Four steps of fatty acid synthesis
- e) Standard redox potential and it's significance

Q5) Attempt the following. **[10]**

- a) With the help of diagram explain ETC and oxidative phosphorylation
- b) Explain in detail the mechanism of enzyme pyruvate dehydrogenase.

SECTION-II

Q6) Answer the following questions. **[5]**

- a) Write the significance of pyrimidine synthesis
- b) What are non-ribosomal - proteins synthesis
- c) What is significance of porphyrins
- d) Define the term oxidative deamination
- e) What is Gout

Q7) a) Answer the following questions. **[6]**

i) Elaborate the role of Tetrahydrofolate in the conversion of serine to Glycine (ser→Gly)

ii) Write short account on phenyl-ketouria

b) Attempt the following conversions. **[4]**

i) Uracil → β -alanine

ii) UMP → UDP → UTP

Q8) a) Answer the following questions. **[6]**

i) 'Degradation of Branched chain amino acid' Explain

ii) What are 'polyamines'? write about the synthesis of GABA from Glutamate

b) Attempt the following **[4]**

i) Conversion ofUMP → dTMP.

ii) Regulation of pyrimidine biosynthesis

Q9) Write short note on the following **[5×2=10]**

a) Transamination Reactions

b) Salvage purine biosynthesis

c) Glutathione biosynthesis

d) Maple syrup urine disease

e) Histidine synthesis from Histamine

Q10) Attempt the following questions. **[2×5=10]**

a) With the help of example explain the role of enzyme Ribonucleotide Reductase

b) Explain in detail urea cycle with Energetics



Total No. of Questions : 10]

SEAT No. :

[Total No. of Pages : 3

PE4535

[6511]-22

F.Y. M.Sc.

BIOCHEMISTRY

CHB-552-MJ : Membrane Biochemistry and Genetics
(2023 Credit Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 and Q.6 are compulsory and carry 5 marks each.*
- 2) *Attempt any three questions from Q.2 to Q.5.*
- 3) *Attempt any three questions from Q.7 to Q.10.*
- 4) *Answer to the two sections should be written in separate answer books.*
- 5) *Figures to the right indicate full marks.*

SECTION - I

(Membrane Biochemistry)

Q1) Answer the following.

[5]

- a) What is the function of membrane proteins?
- b) Define Endocytosis.
- c) What is the primary function of gap junctions in animal cells?
- d) Which molecule can pass freely through nuclear pore and which require active transport?
- e) Explain the term “selective permeability” in the context of the plasma membrane.

Q2) Answer the following questions.

- a) Differentiate between carrier ionophores and channel forming ionophores. **[4]**
- b) How does nuclear pore maintain selective transport between a nucleus and cytoplasm? **[3]**
- c) Discuss the mechanism of facilitated diffusion. **[3]**

P.T.O.

Q3) Answer the following questions.

- a) How do freeze-fracture electron microscopy studies contribute to understanding membrane models? [3]
- b) What is the mechanism of action of ion-translocating antibiotics? [3]
- c) Discuss the factors affecting physical properties of membrane. [4]

Q4) Explain the following.

- a) Danielle-Davson model of Membrane. [2]
- b) Effect of cholesterol on membrane structure at high and low temp. [2]
- c) Experimental evidence that supports fluid mosaic model. [3]
- d) Phosphotransferase system. [3]

Q5) Attempt the following questions.

- a) What are the different constituents of biological membranes? Explain the role of each. [5]
- b) Explain in detail, How do voltage gated ion channel contribute to action potential generation? [5]

SECTION - II

(Genetics)

Q6) Answer the following. [5]

- a) What is meant by “semi-conservative replication” of DNA?
- b) What distinguishes an Hfr strain from an F⁺ strain?
- c) Name a genetic disorder caused by deletion of a chromosome segment.
- d) What is a cosmid, and how does it differ from a regular plasmid or phage vector?
- e) List the key components of an operon and their respective roles.

Q7) Answer the following.

- a) Describe the experimental evidence that established DNA as the genetic material. Discuss the contributions of Griffith, Avery, and Hershey - Chase. [4]
- b) What is a complementation test? Describe how it is used to determine functional gene units. [3]
- c) Differentiate between auxotrophs and prototrophs. How can auxotrophs be used to study metabolic pathways? [3]

Q8) Explain the following.

- a) Denaturation and Renaturation of DNA. [3]
- b) Benzer's fine-structure mapping reveal about the gene. [4]
- c) Plasmid as vector. [3]

Q9) Attempt the following questions.

- a) Differentiate between homozygous and heterozygous genotypes. [2]
- b) What are conditional mutants? Give examples. [2]
- c) Explain the structure of DNA as proposed by Watson and Crick. How does this structure facilitate replication? [3]
- d) Explain the one gene-one polypeptide/cistron hypothesis. How did it refine the earlier one gene-one enzyme theory? [3]

Q10) Answer the following.

- a) Explain Mendel's Laws of Inheritance using suitable examples. [5]
- b) What is teratogenesis? Describe its causes and effects with reference to critical periods of development and specific teratogens (e.g., thalidomide, alcohol). [5]



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE4536

[6511]-23

First Year M.Sc.

BIOCHEMISTRY

**CHB-553-MJ : Techniques in Characterization of Biomolecules
(2023 Credit Pattern) (Semester - II)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question no. 1 is compulsory.
- 2) Attempt any three questions from Q.2 to Q.5.
- 3) Figures to the right indicate full marks.

Q1) Attempt the following questions. [5]

- a) What is sedimentation velocity?
- b) List advantages of LCMS.
- c) Write any two applications of ultra centrifugation.
- d) List the types of radiation used in Biochemistry.
- e) What is NMR?

Q2) a) Answer the following questions. [6]

- i) Write the principle and applications of NMR.
- ii) Explain partial specific volume and diffusion coefficient.

b) Attempt the following questions. [4]

- i) What is LCMS?
- ii) What is chemical shift in NMR.

Q3) Write short notes on the following. [5×2=10]

- a) Principle of zonal centrifugation.
- b) Application of Ostwald's capillary viscometer.
- c) Radioactivity.
- d) Applications of GCMS.
- e) Viscosity.

P.T.O.

- Q4)** a) Attempt the following questions. [6]
- i) Write about stripping method of autoradiography. [3]
 - ii) Give principle of ORD. [3]
- b) Attempt the following questions. [4]
- i) Write application of CD.
 - ii) How will you prepare samples for MACDI.

- Q5)** Answer the following questions. [10]
- a) Define sedimentation coefficient. Explain the effect of shape on it. [5]
 - b) Discuss the equipments used in Circular Dichorism (CD). [5]



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE4537

[6511]-24

First Year M.Sc.

BIOCHEMISTRY

CHB-560-MJ : Bioinformatics

(2023 Credit Pattern) (Semester - II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Attempt any 3 questions from Q.2 to Q.5.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions. (any 5)

[5]

- a) Mention two DNA sequence databases.
- b) What is rooted tree?
- c) Name one widely used tool for constructing phylogenetic trees.
- d) Define the term “Homology” in the context of sequence alignment.
- e) What is Ex PASY?
- f) Explain Uni Parc.

Q2) a) Answer the following questions.

[6]

- i) Define computational biology and its significance in modern biological research.
- ii) Importance of Literature Search in Scientific Research.

b) Answer the following questions.

[4]

- i) How is the h-index calculated and what does it indicate about a researcher’s impact?
- ii) Describe Gen Bank.

P.T.O.

Q3) Write a short note (any 5)

[10]

- a) Pub Med
- b) FASTA format
- c) Impact factor
- d) BLAT
- e) DDBJ
- f) db EST

Q4) a) Answer the following questions.

[6]

- i) Discuss the role and significance of the NCBI in bioinformatics.
- ii) Describe pair-wise alignment and discuss their applications in bioinformatics.

b) Answer the following questions.

[4]

- i) What is the purpose of phylogenetic analysis?
- ii) Describe RNA Sequence Databases.

Q5) Answer the following questions. (any 2)

[10]

- a) Explain the importance of long non-coding RNA databases in functional genomics research.
- b) Discuss the significance of PDB in protein structure determination and analysis.
- c) Elaborate on the application of Gen Pept, Uni Prot kB in protein sequence analysis.



Total No. of Questions : 7]

SEAT No. :

[Total No. of Pages : 2

PE4538

[6511]-31

M.Sc. - II

BIO CHEMISTRY

**CHB-601 MJ : Molecular Biology
(2023Credit Pattern) (Semester - III)**

Time : 3Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicates full marks.*

Q1) Answer in short (any 5): **[10]**

- a) What is the function of enzyme helicase?
- b) What is Transcription? Explain in brief.
- c) Define exon and intron.
- d) Define protein glycosylation.
- e) Give the role of tRNA in Translation.
- f) What are ribosomes?
- g) What is Rho factor?

Q2) a) Answer any 2 of the following: **[6]**

- i) Describe in detail about mobile genetic element.
- ii) Write a short note on SOS repair.
- iii) Describe the inhibitors of translation.

b) Explain the bi-directional mode of replication in DNA. **[4]**

Q3) a) Answer any 2 of the following: **[6]**

- i) Write a short note on p53 gene.
- ii) Describe the promoters of Translation.
- iii) Write a short note on protein targeting.

b) Describe site specific recombination. **[4]**

P.T.O.

- Q4) a)** Answer any 2 of the following: [6]
- i) Describe in detail the processing of RNA.
 - ii) Explain the fidelity of DNA.
 - iii) Describe the structure of ribosomes in prokaryotes.
- b) Explain the mechanism of initiation of Translation in Prokaryotes. [4]
- Q5) a)** Answer any 2 of the following: [6]
- i) Write a note on RNA editing.
 - ii) Differentiate between Eukaryotic and Prokaryotic Replication.
 - iii) What are okazaki fragments? How are they formed?
- b) Explain the mechanism of mismatch repair system. [4]
- Q6) a)** Answer any 2 of the following: [6]
- i) Explain the role of signal sequence in protein trafficking.
 - ii) Write a note on ubiquitin.
 - iii) Explain in detail DNA repair genes.
- b) Describe in detail direct transposition and replicative transposition. [4]
- Q7)** Answer any 4 of the following: [10]
- a) Explain the central dogma of molecular biology.
 - b) Describe the functions of Topoisomerase enzyme.
 - c) What is 5' capping?
 - d) Give the role of mRNA.
 - e) Explain shine-Dalgarno sequence.



Total No. of Questions : 10]

SEAT No. :

[Total No. of Pages : 3

PE4539

[6511]-32

S.Y. M.Sc.

BIOCHEMISTRY

CHB-602-MJ : Medical Biochemistry and Immunology

(2023 Credit Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 and Q.6 are compulsory.*
- 2) *Solve any three questions form Q.2 to Q.5.*
- 3) *Solve any three quetions from Q.7 to Q.10.*
- 4) *Use separate answer sheets for both sections.*
- 5) *Figures to the right indicate full marks.*

SECTION - I

(Medical Biochemistry)

Q1) Answer the following questions :

[5]

- a) What is pinocytosis?
- b) What do you understand by term carcinogenesis?
- c) List any three (LSD) lysosomal storage disease.
- d) Define the term necrosis.
- e) List the types of thalassemia.

Q2) a) Answer the following questions :

[6]

- i) Explain the intrinsic pathway of apoptosis.
- ii) Discuss the mechanism of action of 'Polyenes'. When react with fungal membrane.

b) Attempt the following questions :

[4]

- i) Write the short on 'Autophagy'.
- ii) List the enzymes used in study of Ischemic heart diseases, write their significances.

P.T.O.

Q3) Write short notes on the following : **[10]**

- a) Macrolides
- b) Hallucinogens and their effects.
- c) Mutation in sickle cell anaemia.
- d) Characteristics of cancer cell.
- e) Mode of action of sulfonamides.

Q4) a) Attempt the following questions. **[6]**

- i) How protooncogenes are converted to oncogenes? Explain in detail.
- ii) Explain mode of action of any one antiviral drug.

b) Attempt the following questions. **[4]**

- i) Discuss the pathophysiological condition arises due to sickle cell anemia.
- ii) What is 'Angina'?

Q5) Answer the following questions (Any two). **[10]**

- a) Explain the mechanism of action of tetracycline.
- b) How Penicillin work as a cell wall synthesis inhibitors?
- c) List and explain various mechanism adopted by bacteria to achieve resistance to antibiotics.

SECTION - II

(Immunology)

Q6) Answer the following questions. **[5]**

- a) What is bone marrow?
- b) What do you mean by neutralization in innate response?
- c) Write application of westernblott?
- d) What are blood group antigen?
- e) Write principle of Immunoelectrophoresis.

Q7) Answer the following questions. [6]

- a) i) With the help of diagram explain the structure of class II MHC.
ii) What is ELISA? Explain various types with the help of diagram.
- b) Attempt the following questions. [4]
 - i) What is 'MALT, BALT and GALT.
 - ii) What is 'Humoral' immune responses?

Q8) Write short notes on the following : [5×2=10]

- a) Haematopoiesis.
- b) Autoimmune disorders
- c) Immunodiffusion
- d) Type II hypersensitivity
- e) Constant and variable region of the antibody.

Q9) a) Answer the following questions. [6]

- i) Explain the classical pathway of complement activation.
- ii) Write short account on cell mediated immune response with diagram.
- b) Attempt the following questions. [4]
 - i) Explain the radio immuno assay principle.
 - ii) What are polyclonal antibodies?

Q10) Answer the following questions. [10]

- a) How T cells are mature in Thymus?
- b) Explain the mechanism of antigen presentation using class I MHC molecules.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE4540

[6511]-33

S.Y.M.Sc.

BIOCHEMISTRY

**CHB-603 MJ : Biochemistry of Specialized Tissue
(2023 Credit Pattern) (Semester - III)**

Time : 2Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is compulsory and carries 5 marks.*
- 2) *Attempt any three questions from Q.2 to Q.5.*
- 3) *Figures to the right hand indicate full marks.*

Q1) Answer the following questions (any five): **[5]**

- a) How are bacterial cells motile?
- b) What is the role of ATP in contraction?
- c) How do nerve toxins affect acetylcholine?
- d) What is the significance of the retinal pigment epithelium?
- e) What is the role of olfactory receptors in the sense of smell?
- f) Write the role of taste receptors in detecting sweet substances.

Q2) Answer the following.

- a)
 - i) Describe the ultrastructural organization of skeletal muscle. **[3]**
 - ii) Explain the role of the basilar membrane in hearing. **[3]**
- b)
 - i) How is ATP utilized during muscle contraction? **[2]**
 - ii) What role does calcium play in muscle contraction? **[2]**

Q3) Write short notes on (any five). **[10]**

- a) Structural properties of rhodopsin.
- b) Cochlea.
- c) Olfactory receptors.
- d) Transducin
- e) Taste receptors
- f) Olfactory signal transduction?

P.T.O.

Q4) Solve the following.

- a) i) What are the three types of muscle tissue in the human body? [3]
- ii) Outline the role of K^+ channels in repolarization of the neuron. [3]
- b) i) Name the main protein found in thick filaments. [2]
- ii) What is a cholinergic receptor? Explain with an example. [2]

Q5) Attempt any two of the following. [10]

- a) Discuss the regulation of muscle contraction, including the roles of neurotransmitters and hormones in both skeletal and cardiac muscles.
- b) Explain the structure and function of Na^+ and K^+ channels in detail, including their roles in establishing resting membrane potential.
- c) Describe the process of visual signal amplification in the retina.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE4541

[6511]-34

S.Y. M.Sc.

BIOCHEMISTRY

CHB-612-MJ : Applied Plant Biochemistry

(2023 Credit Pattern) (Semester - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is compulsory and carry 5 marks.*
- 2) *Attempt any three questions from Q.2 to Q.5.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following (Any 5) :

[5]

- a) Name the synthetic Auxin used as herbicide.
- b) Give any two applications of Gum.
- c) What is mineral nutrition?
- d) Give any two biological roles of phenolic compounds.
- e) What is the function of lignin present in plant cell wall?
- f) Name any two aerobic Nitrogen fixing bacteria.

Q2) Answer the following :

- a) i) Discuss functions of alkaloids in plants. **[3]**
- ii) Give role of Gibberellin in plant growth. **[3]**
- b) i) What is denitrification? **[2]**
- ii) Significance of lignin in plants cell. **[2]**

Q3) Write short notes on (Any five)

[10]

- a) Photosystem I
- b) Ethylene hormone
- c) Non-cyclic photophosphorylation.
- d) Green house
- e) Absciscic acid
- f) Plastids

P.T.O.

Q4) Solve the following :

- a) i) Explain any one example of phytoremediation. [3]
- ii) Describe distribution of auxin in plants. [3]
- b) i) Discuss any two microelements with deficiency disorders. [2]
- ii) What are advantages of hydroponics? [2]

Q5) Attempt any two of the following : [10]

- a) Discuss nitrogen assimilation in plants.
- b) Give classification of secondary metabolites.
- c) Explain crassulacean acid metabolism (CAM) Pathway.



Total No. of Questions : 5]

SEAT No. :

PE4542

[Total No. of Pages : 2

[6511]-35

M.Sc. - II

BIOCHEMISTRY

CHB-610-MJ : Toxicology

(2023 Credit Pattern) (Semester - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any three questions from Q.No.2 to Q.No.5.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions. **[5]**

- a) Define the term forensic toxicology.
- b) What do you mean by irritant poisons?
- c) Define the term Allergic Reactions.
- d) What is Antidote?
- e) Write an examples of Antidepressants.

Q2) a) Attempt the following questions. **[6]**

- i) Explain the characteristics of cytochrome P450 complex.
- ii) Write about the General principles of management of poisoning.

b) Answer the following questions. **[4]**

- i) What is reversible verses irreversible toxicity?
- ii) What are irritant poisons? Explain symptoms.

P.T.O.

Q3) Write short notes on the following.

[10]

- a) Hallucinogens
- b) Risk and safety of toxic doses
- c) Antihistamines
- d) Detoxication reactions
- e) Metallic poisons

Q4) a) Answer the following questions.

[6]

- i) What is dose response? Give its types.
- ii) What are psychotropic substances? Explain its uses and classification.

b) Attempt the following questions.

[4]

- i) Define the term tolerance with types.
- ii) Write various applications of Forensic Toxicology.

Q5) Answer the following questions.

[10]

- a) Write phase I and phase II Biotransformation reaction with explanation.
- b) What are miscellaneous poisons? Explain types of miscellaneous poisons with examples and effect.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE4543

[6511]-36

S.Y.M.Sc.

BIOCHEMISTRY

**CHB-611 MJ : Physiological Biochemistry
(2023 Credit Pattern) (Semester - III)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question No.1 is compulsory.*
- 2) *Attempt any three questions from Q No.2 to Q No.5.*
- 1) *Figures to the right indicates full marks.*

Q1) Attempt the following questions. [5]

- a) Define the term Respiratory acidosis.
- b) List the composition of blood.
- c) List the various functions of kidney.
- d) How vitamins are absorbed?
- e) What is polycythemia.

Q2) a) Answer the following question: [6]

- i) What is anemia? Describe various types of it.
- ii) With the help of diagram describe how Bilirubin is formed and excreted from the body.

b) Attempt the following questions. [4]

- i) List the blood parameters used to assess the function of liver.
- ii) Define the term metabolic alkalosis.

Q3) Write short notes on the following. [5×2=10]

- a) Platelet aggregation.
- b) Fibrinolysis.
- c) Bohr's effect.
- d) Transport of oxygen.
- e) Functions of kidney.

P.T.O.

Q4) a) Answer the following questions. **[6]**

- i) Describe Extrinsic pathway of blood coagulation
- ii) Draw a neat labelled diagram of Nephron and describe it.

b) Attempt the following questions. **[4]**

- i) Write the functions of Minerals, Calcium and Potassium.
- ii) Define the term Jaundice.

Q5) Answer the following questions. **[10]**

- a) Write about Platelet aggregation and describe the intrinsic pathway of coagulation.
- b) With the help of diagram explain 'Juxtaglomerular apparatus, a part of kidney.



Total No. of Questions :6]

SEAT No. :

[Total No. of Pages : 2

PE4544

[6511]-41

M.Sc.-II

BIOCHEMISTRY

CHB-651 -MJ : GENETIC ENGINEERING

(2023 Credit Pattern) (Semester-IV)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*

Q1) Attempt the following.

[5×2=10]

- a) Explain RNA interference.
- b) What is the role modifying enzymes in genetic engineering?
- c) Draw and explain the structure of pBR322.
- d) Write the applications of PCR.
- e) What is transformation? Write the formula to calculate transformation efficiency.

Q2) Attempt the following questions (any 2)

[2×5=10]

- a) Explain the concept of genetic engineering.
- b) Explain blue white screening.
- c) Write the use of RFLP in forensic science.

Q3) Write short note on the following (any 3).

[3×5=15]

- a) Concept of genetic engineering.
- b) CRISPR/Cas9
- c) Recombinant antibodies.
- d) Colony hybridization.

P.T.O.

Q4) Answer the following. [10]

- a) Explain restriction mapping.
- b) Describe the role of M13 and λ bacteriophages as a vector for cloning.

Q5) Attempt the following. [3×5=15]

- a) What do you mean by recombinant hormone? With reference to insulin, explain recombinant hormone production and its advantages.
- b) What is RT-PCR? What is the principle of RT-PCR? Explain its application.
- c) Explain cosmid and phagemid as cloning vectors with example.

Q6) Answer the following. [10]

- a) Give an elaborative account of the important features of DNA polymerases and distinguish between the various DNA polymerases used in genetic engineering.
- b) Why is the Ti plasmid from *Agrobacterium tumefaciens* well suited for developing a vector to transfer foreign gene into plant cells? Explain cloning strategy.



Total No. of Questions : 10]

SEAT No. :

[Total No. of Pages : 3

PE4545

[6511]-42

M.Sc. - II

BIOCHEMISTRY

**CHB-652-MJ : Fermentation Technology and Tissue Culture
(2023 Credit Pattern) (Semester - IV)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 and Q.6 are compulsory and carry 5 marks each.*
- 2) *Attempt any three questions from Q.2 to Q.5.*
- 3) *Attempt any three questions from Q.7 to Q.10.*
- 4) *Answer the two sections should be written on separate answer sheets.*
- 5) *Figures on right hand side indicate marks.*

SECTION - I

Q1) Answer any five of the following.

[5]

- a) Define BOD.
- b) What are the commonly used carbon sources in fermentation?
- c) What are the ideal characteristics of the antifoams?
- d) Which design organism is considered during sterilization?
- e) What are things that are filter sterilized in fermentation industry?
- f) Which growth phase is usually longer in continuous culture?

Q2) a) Attempt the following.

[6]

- i) Explain the method of liquid-liquid extraction used for product recovery.
- ii) Explain the importance of sterilization process in fermentation?

b) Attempt the following.

[4]

- i) Give the flow diagram of continuous sterilization.
- ii) What are the different waste disposal sites?

P.T.O.

- Q3)** a) Attempt the following. [6]
i) Explain the importance of centrifugation in product recovery?
ii) What are different types of valves used for controlling the flow in fermentation?
b) Attempt the following. [4]
i) What do you understand from air lift fermenter?
ii) Which are the methods used for causing mutations in bacteria?
- Q4)** a) Attempt the following. [6]
i) How variation in flow rate affects the continuous fermentation?
ii) What is meant by media composition?
b) Attempt the following. [4]
i) What are the different criteria for choice of microorganism for industrial process?
ii) How aseptic conditions are maintained during sampling?
- Q5)** Answer any two of the following. [10]
a) Discuss in details biological methods used for effluent treatment.
b) What are the different chromatographic methods used for recovery of the product from the fermentation medium?
c) Discuss the importance of strain improvement of industrially important microorganism?

SECTION - II

(Tissue Culture)

- Q6)** Attempt the following. [5]
a) Write the importance of animal organ culture.
b) Write the importance of embryo culture.
c) Define suspension culture.
d) What is advantage of serum containing media.
e) Why is it necessary to subculture the cell lines?
f) Define contact inhibition.

- Q7)** a) Write short note on the following. [6]
i) Micropropagation.
ii) Cell fusion methods.
- b) Attempt the following. [4]
i) What do you mean by contact inhibition? How does it affect cell line?
ii) Write the importance of weaning and hardening.
- Q8)** Write short note on the following (any 5). [10]
a) Sterilization methods
b) Somaclonal variation
c) Tissue culture laboratory
d) Somatic hybridization.
e) Importance of plant tissue culture
f) Root culture
- Q9)** a) Answer the following. [6]
i) What are types of primary culture?
ii) Explain active principles in medicinal plants.
- b) Attempt the following. [4]
i) Discuss different types of protoplast fusion. What chemical compounds have been used as fusogen agents?
ii) Define and write the importance of cell banking.
- Q10)** Attempt any two of the following. [10]
a) Explain the role of macro and micro nutrients used in media used for animal tissue culture.
b) Explain callus culture preparation with uses of callus.
c) Explain methods of cell preservation.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE4546

[6511]-44

M.Sc. (Part - II)

BIOCHEMISTRY

CHB-660-MJ : Endocrinology

(NEP 2023 Credit Pattern) (Semester - IV)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q. No. 1 is compulsory which carry 5 marks.*
- 2) *Attempt any three questions from Q.2 to Q.5.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following questions :

[5]

- a) Define the term target cell.
- b) Draw labelled diagram of thyroid follicular cell.
- c) What are receptors?
- d) List the functions of catecholamines.
- e) Define the term hormone.

Q2) a) Answer the following question.

[6+4=10]

- i) Explain the mode of action of thyroid stimulating hormone in the secretion of T_3 and T_4 . **[3]**
- ii) Explain the cross section of adrenal gland with respect to various layers and hormones secreted by the layers with diagram. **[3]**
- b) Answer the following questions. **[4]**
 - i) Explain target cell insensitivity with example. **[2]**
 - ii) Define the osteoblast and osteoclast with function. **[2]**

P.T.O.

Q3) Write short notes on following :

[5×2=10]

- a) For channel receptors
- b) Synthesis of peptide hormones
- c) Classification of hormone
- d) Parathyroid gland
- e) Calcium calmodulin system

Q4) a) Answer the following questions.

[6+4=10]

- i) Explain the function and secretion of any two gastrointestinal hormone. **[3]**
- ii) What are growth hormones? How they are secreted? Elaborate the mechanism of action of it. **[3]**
- b) Attempt the following questions. **[4]**
 - i) Elaborate the term thyroglobulin. **[2]**
 - ii) Write the physiological role of glucocorticoids. **[2]**

Q5) Attempt the following questions.

[2×5=10]

- a) Why c-AMP is termed as secondary messenger? Explain its mode of action with example. **[5]**
- b) Which hormones are secreted by posterior pituitary gland? Explain mechanism of action with diagram. **[5]**



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE4547

[6511]-45

M.Sc. - II

BIOCHEMISTRY

CHB-661-MJ : Food Technology

(NEP 2023 Credit Pattern) (Semester - IV)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Questions 2 to 5 carry equal marks.*
- 4) *Figures to the right indicate full marks.*

Q1) Answer the following questions :

[5]

- a) What is food analysis in food technology?
- b) List the anti caking agent used in general.
- c) Which parameters are included in the proximate composition analysis of food?
- d) Define the term food additives.
- e) List various natural sweeteners used in food technology.

Q2) a) Answer the following questions :

[6+4=10]

- i) What is single cell protein? What are sources of single cell protein? List advantages of it.
 - ii) Which factors are responsible to spoil the food? Add short note on any one factor.
- b) Answer the following questions :
- i) What is spirullina?
 - ii) List the examples types of genetically modified food.

Q3) Write a short note on the following :

[5×2=10]

- a) Food preservatives
- b) Meat tenderization
- c) Enzymes in food processing
- d) FSSI laws
- e) Effect of germination on carbohydrates

P.T.O.

Q4) a) Answer the following questions : **[6+4=10]**

- i) What is Irradiation? How it change the lipid contents of food?
- ii) What are natural and artificial colour used in food industry? Give examples.

b) Attempt the following questions :

- i) Give examples of unconventional source of protein.
- ii) Give examples of fruit juice processing enzymes.

Q5) a) Answer the following questions : **[6+4=10]**

- i) Describe the process of starch production.
- ii) Explain role of enzymes in meat tenderization.

b) Answer the following questions :

- i) List the various sources of irradiation used in food technology.
- ii) List applications of single cell proteins.

