

ANNEXURE E

FACULTY OF LIFE SCIENCES

SYLLABUS FOR THE

SUBJECT: CHEMISTRY

For the award of the Degree in

Bachelor of Science (Biotechnology) Three Year Degree Programme

**Bachelor of Science (Honours) (Biotechnology) Four Year Degree
Programme**

(Credit Based Continuous Evaluation Grading System)

Under NEP-2020

Semester IV

Session: 2026-27



**The Heritage Institution
KANYA MAHA VIDYALAYA
JALANDHAR
(AUTONOMOUS)**

KANYA MAHA VIDYALAYA JALANDHAR (AUTONOMOUS)
SCHEME AND CURRICULUM OF EXAMINATION OF FOUR YEAR UNDER
GRADUATE DEGREE PROGRAMME

Bachelor of Science (Biotechnology) Three Year Degree Programme

Bachelor of Science (Honours) (Biotechnology) Four Year Degree Programme

Credit Based Continuous Evaluation Grading System (CBCEGS)

(Session: 2026-27)

Bachelor of Science (Biotechnology) Three Year Degree Programme Bachelor of Science (Honours) (Biotechnology) Four Year Degree Programme Semester-IV										
Course Code	Course Title	Course Type	Hours Per Week L-T-P	Credits L-T-P	Total Credits	Marks				Examination time (in Hours)
						Total	Th	P	CA	
BBTM-4084	Chemistry	Minor	3-0-0	3-0-0	3	100	50	-	30	3
BBTM-4084 (P)	Lab in Chemistry	Minor	0-0-2	0-0-1	1		-	20		3

Bachelor of Science (Biotechnology) Three Year Degree Programme
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(Under NEP 2020)
(Session: 2026-27)
(Semester IV)
COURSE CODE: BBTM-4084
COURSE TITLE: Chemistry

Course Outcomes

Students will be able to

CO1: Explain the basic concepts of bio-organic chemistry, including functional groups of biomolecules, stereochemistry, chemical bonding, and reactive intermediates involved in biological systems.

CO2: Describe the structure, properties, and biological significance of amino acids, peptides, and proteins, including protein folding, denaturation, and the role of important proteins in living organisms.

CO3: Explain the chemistry of lipids and biomembranes and apply the principles of chemical equilibrium to chemical and biological processes.

CO4: Apply the principles of chemical kinetics, catalysis, and nucleic acid chemistry to understand reaction mechanisms, enzyme action, and the structure and functions of DNA and related biomolecules.

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(Session: 2026-27)
(Semester IV)
COURSE CODE: BBTM-4084
COURSE TITLE: Chemistry

Exam Time: 3Hrs.
Credit (L-T-P): 3-0-1

Max. Marks: 100
(Theory:50, Practical:20, CA:30)

Instructions for the Paper Setters: Eight questions of equal marks (ten marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit I

Bio Organic Chemistry: Functional groups of Biomolecules, Geometry of C bonding, chirality and 3D structure- configuration, confirmations, steric hinderance. Stereo isomers and geometric isomers. Stereo specific interactions. Factors affecting co-ordination numbers and stereo-chemistry, Isomerism in coordination compounds.

Reactive intermediates

Carbocations, carbanions, free radicals, carbenes, arenes and nitrenes(with examples). Assigning formal charges on intermediates and other ionic species, Stereochemistry of chemical reactions that produce chiral centres, chemical reactions that produce stereoisomers, Resolution of enantiomers, chiral centres other than carbon, prochirality

Bonding

Chemical bonding and intramolecular forces, Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bond, Vander Waals interactions, resonance, hyperconjugation, hydrogen bonding and Inductive and electrometric effects.

Unit II

Chemistry of Amino acids & Proteins: Ramachandran plot for amino acids. Peptide bond formation - Planar structure, stabilization & peptide conformation (ϕ & ψ). Peptide hormones (glucagon) and antimicrobial peptides. Forces stabilizing the 3D structure of proteins, Protein denaturation and folding. Molecular chaperons, Protein misfolding. Oxygen binding proteins (Haemoglobin & Myoglobin) and Histones. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio.

Unit III

Chemistry of Lipids: Biomembrane: Behavior of amphipathic lipids in water- formation of micelles, bilayers, vesicles, liposomes. Membrane composition and organization – Fluid mosaic model.

SOLUTIONS: Chemical Equilibrium : General characteristics of chemical equilibrium, thermodynamic derivation of the law of chemical equilibrium, Van't Hoff reaction isotherm. Relation between K_p , K_c and K_x . Temperature dependence of equilibrium constant Van't Hoff equation, homogeneous & heterogeneous equilibria, Le Chatelier's principle

Unit IV

CHEMICAL KINETICS AND CATALYSIS: Scope, rate of reaction, influencing factors such as concentration, temperature, pressure, solvent etc. theories of chemical kinetics. Arrhenius equation, concept of activation energy. Rates of reactions, rate constant, order and molecularity of reactions. Chemical Kinetics: Differential rate law and integrated rate expressions for zero, first, second and third order reactions. Half-life time of a reaction. Methods for determining order of reaction. Effect of temperature on reaction rate and the concept of activation energy. Catalysis : Homogeneous catalysis, Acid-base catalysis and enzyme catalysis (Michaelis-Menten equation). Heterogeneous catalysis.

Chemistry of Nucleic acids: Nucleotides as energy carrier, cofactors & regulatory molecules (cyclic AMP). Unusual structures in DNA (Palindrome, mirror repeats, hairpins and cruciform), Structural polymorphism in DNA, DNA stability, DNA hybridization.

Books Recommended:

1. G.L. Eichorn, Inorganic Biochemistry, Vol. I Elsevier,
2. J.E. Huheey, E.A. Keiter, R.L. Keiter, Inorganic Chemistry, 4th ed. Pearson Education, Singapore, 1999.
3. D.F.C Shriver, P.W. Atkins and C.H. Langford, Inorganic Chemistry, ELBS Oxford, 1991.
4. Cowan, J.A. (1997) – Inorganic Biochemistry – An Introduction, Wiley- VCH

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(Session: 2026-27)
(Semester IV)
COURSE CODE: BBTM-4084 (P)
COURSE TITLE: Lab in Chemistry

Course Outcomes:

Students will be able to

CO1: Perform basic laboratory techniques for the extraction, precipitation, and qualitative analysis of biomolecules such as carbohydrates, proteins, amino acids, and starch.

CO2: Apply chromatographic and spectroscopic methods for the separation, identification, and characterization of biological and chemical compounds.

CO3: Determine and interpret physicochemical properties of solutions, including pH, buffer action, optical activity, and concentration-dependent absorbance using Beer–Lambert law.

CO4: Demonstrate safe laboratory practices, accurate experimental observations, data recording, and analysis of results related to biochemical and analytical experiments

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(Semester IV)
COURSE CODE: BBTM-4084 (P)
COURSE TITLE: Lab in Chemistry

Time: 3 Hrs
Credits: 3-0-1

Marks: 100
(Theory: 50, Practical: 20, CA: 30)

Instruction for practical examiner: Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE office, Kanya Maha Vidyalaya, Jalandhar.

1. Extraction and Characterization of Starch
2. Qualitative test for Carbohydrates, Amides, - phenols. Aldehydes
3. Isoelectric precipitation of proteins
4. Intracellular total protein precipitation by TCA/ Acetone method
5. Qualitative analysis of proteins
6. Separation of Amino acids by chromatography
7. Verification of Lambert beer's law for solution of $\text{CoCl}_2 \cdot 2\text{H}_2\text{O}$ (in water) and $\text{K}_2\text{Cr}_2\text{O}_7$ (in water)
8. pH of buffer solution
9. Determine the %age composition of an optically active solution

Books Recommended:

- 1) Nelson and Cox, Lehninger. Principles of Biochemistry (7th Edition), W.H Freeman Publishers (2010).
- 2) Dubey R.C, A Textbook of Biotechnology (6th Edition), S. Chand Publishing, reprint, 2014.
- 3) Zubey G. Principles of Biochemistry, Oscar Publication (2000).
- 4) Devlin T. M. Text Book of Biochemistry with Clinical Correlations (4th Edition) Wiley & Sons Publication (2005).
- 5) Roy Tasker, Carl Rhodes. Stryer's Biochemistry (7th Edition) W. H. Freeman publishers (2012).
- 6) R.T. Morison and R.N. Boyd, Organic chemistry
- 7) L. Finar, Organic Chemistry, Vol.I, IV ed. J. March, Advanced Organic Chemistry, Reactions Mechanisms and Structure.
- 8) Physical Chemistry by Peter Atkins 10th edition.
- 9) Thermodynamics for chemists by Samuel Glasstone 2009

FACULTY OF LIFE SCIENCES

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Semester V

Session: 2026-27



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Credit Based Continuous Evaluation Grading System (CBCEGS)
(Session: 2026-27)

Bachelor of Science (Biotechnology) Three Year Degree Programme Bachelor of Science (Honours) (Biotechnology) Four Year Degree Programme Semester-V										
Course Code	Course Title	Course Type	Hours Per Week L-T-P	Credits L-T-P	Total Credits	Marks				Examination time (in Hours)
						Total	Th	P	CA	
BBTM-5085	Chemistry-III	MDC	3-0-0	3-0-0	3	100	50	-	30	3
BBTM-5085 (P)	Lab in Chemistry-III	MDC	0-0-2	0-0-1	1		-	20		3

***MDC= Multi-Disciplinary Course**

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(Semester III)
COURSE CODE: BBTM-5085
COURSE TITLE: Chemistry-III

Course Outcomes:

Students will be able to

CO1: Understand and apply the laws of thermodynamics to evaluate energy changes, spontaneity, and equilibrium in chemical systems, including simple mixtures.

CO2: Analyze solution behavior and equilibrium systems using thermodynamic principles, including colligative properties and Le Chatelier's principle.

CO3: Determine reaction rates and mechanisms by applying kinetic theories and rate laws, and explain the role of catalysts in various chemical processes.

CO4: Interpret electrochemical behavior of electrolytes through conductance, ionic equilibria, and buffer systems, and apply this understanding to conductometric titrations and pH analysis.

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(Semester III)
COURSE CODE: BBTM-5085
COURSE TITLE: Chemistry-III

Exam Time: 3Hrs.

Credit (L-T-P): 3-0-1

Max. Marks: 100

(Theory: 50, Practical:20, CA:30)

Instructions for the Paper Setters: Eight questions of equal marks (ten marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit I

CHEMICAL THERMODYNAMICS:

Objectives and limitations of Chemical Thermodynamics, State functions, thermodynamic equilibrium, work, heat, internal energy, enthalpy. First Law of Thermodynamics : First law of thermodynamics for open, closed and isolated systems. Reversible isothermal and adiabatic expansion/compression of an ideal gas. Irreversible isothermal and adiabatic expansion. Enthalpy change and its measurement, standard heats of formation and absolute enthalpies. Kirchoff's equation. Second and Third Law: Various statements of the second law of thermodynamics. Efficiency of a cyclic process (Carnot's cycle). Entropy. Entropy changes of an ideal gas with changes in P, V, and T. Free energy and work functions. Gibbs-Helmholtz Equation. Criteria of spontaneity in terms of changes in free energy. Third law of thermodynamics: Absolute entropies. Thermodynamics of Simple Mixtures: Partial molar quantities and their significance. Chemical potential and its variation with T and P. Fugacity function and its physical significance. Concept of activity and activity coefficient.

Unit II

SOLUTIONS:

Ideal and non-ideal solutions, method of expression concentrations of solution, activity and activity coefficients, dilute solution, Osmotic pressure, its law and measurements, Elevation of boiling point and depression of freezing points. Chemical Equilibrium : General characteristics of chemical equilibrium, thermodynamic derivation of the law of chemical equilibrium, Van't Hoff reaction isotherm. Relation between K_p , K_c and K_x . Temperature dependence of equilibrium constant Van't Hoff equation, homogeneous & heterogeneous equilibria, Le Chatelier's principle.

Unit III

CHEMICAL KINETICS AND CATALYSIS: Scope, rate of reaction, influencing factors such as concentration, temperature, pressure, solvent etc. theories of chemical kinetics. Arrhenius equation, concept of activation energy. Rates of reactions, rate constant, order and molecularity of reactions. Chemical Kinetics: Differential rate law and integrated rate expressions for zero, first, second and third order reactions. Half-life time of a reaction. Methods for determining order of reaction. Effect of temperature on reaction rate and the concept of activation energy. Reaction mechanism. Steady state hypothesis. Catalysis : Homogeneous catalysis, Acid-base catalysis and enzyme catalysis (Michaelis-Menten equation). Heterogeneous catalysis. Unimolecular surface reactions.

Unit IV

ELECTRO-CHEMISTRY: Specific conductance, molar conductance and their dependence on electrolyte concentration. Ionic Equilibria and conductance, Essential postulates of the Debye-Huckel theory of strong electrolytes. Mean ionic activity coefficient and ionic strength. Transport number and its relation to ionic conductance and ionic mobility. Conductometric titrations. pH scale. Buffer solutions, salt hydrolysis. Acid-base indicators.

Books Recommended :

1. Physical Chemistry by Peter Atkins 10th edition.
2. Thermodynamics for chemists by Samuel Glasstone 2009
3. Chemical Kinetics by Keith J. Laidler 10th edition.
4. Modern Electrochemistry by John O'M Backris and K.N. Reddy 10th edition.

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(Semester V)
COURSE CODE: BBTM-5085 (P)
COURSE TITLE: Lab in Chemistry-III

Course Outcomes:

Students will be able to

CO1: Apply principles of calorimetry to determine thermodynamic parameters such as heat of neutralization and heat of solution for various substances.

CO2: Utilize conductometric methods to determine cell constant, specific/equivalent conductance, and perform titrations for precipitation and acid-base reactions.

CO3: Analyze concentration and absorbance relationships using photometric techniques and validate Lambert-Beer's law.

CO4: Measure and interpret pH values to study buffer solutions, determine ionization constants, and analyze acid-base mixtures using pH metry and polarimetry.

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(Under NEP 2020)

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(Semester V)

COURSE CODE: BBTM-5085 (P)

COURSE TITLE: Lab in Chemistry-III

Time: 3 Hrs

Credit (L-T-P): 3-0-1

Marks: 100

(Theory: 50, Practical: 20, CA: 30)

Instruction for practical examiner: Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE office, Kanya Maha Vidyalaya, Jalandhar.

1. Calorimetry:

a) Determination of Heat of neutralization

(i) Strong acid-strong base

(ii) Weak acid-strong base.

b) Determination of Heat of solution of KCl, NH_4Cl , KNO_3

2. Conductometry:

a) Determination of cell constant.

b) Determination of specific and equivalent conductance of electrolyte (NaCl and HCl).

c) Precipitation titration of Na_2SO_4 vs. BaCl_2 .

d) Neutralization titrations NaOH vs. HCl and NaOH vs. CH_3COOH .

3. Photometry.

Verification of Lambert beer's law for solution of $\text{CoCl}_2\cdot\text{H}_2\text{O}$ (in water) and $\text{K}_2\text{Cr}_2\text{O}_7$ (in water)

4. a) pH of buffer solution

b) Acid base titration HCl vs. NaOH.

c) Determination of ionization constant of a weak acid (CH_3COOH)

5. Determine composition of HCl and CH_3COOH in the given solution pH metrically.

6. Polarimetry: Determine the % age composition of an optically active solution.

Books Recommended :

1. Findlay's Practical Physical Chemistry, 9th Edition, Revised by B.P. Levitt.

2. Experimental Physical Chemistry by RC DAS and B. Behera 9th Edition.

FACULTY OF SCIENCES

SYLLABUS FOR THE

SUBJECT: CHEMISTRY

For the award of the Degree in

Bachelor of Science (Home Science) Three Year Degree Programme

Bachelor of Science (Honours) (Home Science) Four Year Degree

Programme

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Under NEP-2020

Semester III

Session: 2026-27



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(Session: 2026-27)

Bachelor of Science (Home Science) Three Year Degree Programme Bachelor of Science (Honours) (Home Science) Four Year Degree Programme Semester-III										
Course Code	Course Title	Course Type	Hours Per Week L-T-P	Credits L-T-P	Total Credits	Marks				Examination time (in Hours)
						Total	Th	P	CA	
BHSL-3083	Basic Nutritional Biochemistry	MDC	4-0-0	4-0-0	4	100	70	-	30	3

MDC – Multi Disciplinary Course

Bachelor of Science (Home Science) Three Year Degree Programme
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(Session: 2026-27)
(Semester III)
COURSE CODE: BHSL-3083
COURSE TITLE: Basic Nutritional Biochemistry

Course outcomes:

Students will be able to:

CO1: Explain the structural formulae of monosaccharides, disaccharides, and polysaccharides, and relate their structure to biological function.

CO2 : Interpret the structural composition of fatty acids, triglycerides, and phospholipids, and evaluate factors affecting fat stability including rancidity, acid value, and saponification value.

CO3 : Illustrate the major pathways of carbohydrate and lipid metabolism, including glycolysis, TCA cycle, gluconeogenesis, and fatty acid biosynthesis and oxidation.

CO4 : Describe the metabolic roles and regulatory mechanisms of inorganic elements such as calcium, phosphorus, magnesium, and iron in the human body.

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(Semester III)
COURSE CODE: BHSL-3083
COURSE TITLE: Basic Nutritional Biochemistry

Exam Time: 3Hrs.

Credit (L-T-P): 4-0-0

Max. Marks: 100

(Theory: 70, CA: 30)

Instructions for the Paper Setters: Eight questions of equal marks (fourteen marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT I

Structural formulae of monosaccharides, disaccharides and polysaccharides.

UNIT II

Structural formula of fatty acids, triglycerides and phospholipids.

Rancidity of fat & its prevention.

Acid value and saponification value of fat.

Essential fatty acid.

UNIT III

Intermediary Metabolism of Carbohydrates

Glycolysis TCA Cycle, Gluconeogenesis.

Study of intermediary metabolism of fat oxidation and biosynthesis of fatty acids.

UNIT IV

Metabolism of inorganic elements calcium, phosphorus, magnesium and iron

Books Suggested

- 1) Nelson, D. L., & Cox, M. M. (2021). *Lehninger principles of biochemistry* (8th ed.). W.H. Freeman and Company.
- 2) Berg, J. M., Tymoczko, J. L., & Stryer, L. (2019). *Biochemistry* (9th ed.). W.H. Freeman and Company.
- 3) Satyanarayana, U., & Chakrapani, U. (2021). *Biochemistry* (5th ed.). Elsevier India.
- 4) Vasudevan, D. M., Sreekumari, S., & Vaidyanathan, K. (2020). *Textbook of biochemistry for medical students* (9th ed.). Jaypee Brothers Medical Publishers.
- 5) Rodwell, V. W., Bender, D. A., Botham, K. M., Kennelly, P. J., & Weil, P. A. (2018). *Harper's illustrated biochemistry* (31st ed.). McGraw-Hill Education.
- 6) Champe, P. C., & Harvey, R. A. (2018). *Lippincott's illustrated reviews: Biochemistry* (7th ed.). Wolters Kluwer.
- 7) Chatterjea, M. N., & Shinde, R. (2020). *Textbook of medical biochemistry* (9th ed.). Jaypee Brothers Medical Publishers.
- 8) Joshi, S. A. (2016). *Nutrition and dietetics* (5th ed.). McGraw-Hill Education.
- 9) Voet, D., Voet, J.G. (2012). *Fundamentals of Biochemistry*, John Wiley and Sons, New York.
- 10) Jain, J. L., Jain, S. and Jain. N. (2016). *Fundamentals of Biochemistry*, S. Chand & Company Ltd., New Delhi.

FACULTY OF SCIENCES
SYLLABUS FOR THE
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Semester IV
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(Session: 2026-27)

Bachelor of Science (Home Science) Three Year Degree Programme Bachelor of Science (Honours) (Home Science) Four Year Degree Programme Semester-IV										
Course Code	Course Title	Course Type	Hours Per Week L-T-P	Credits L-T-P	Total Credits	Marks				Examination time (in Hours)
						Total	Th	P	CA	
BHSM-4085	Applied Nutritional Biochemistry	MDC	3-0-2	3-0-1	4	100	50	20	30	3+3

MDC – Multi Disciplinary Course

Bachelor of Science (Home Science) Three Year Degree Programme
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(Under NEP 2020)

(Session: 2026-27)

(Semester IV)

COURSE CODE: BHSM-4085

COURSE TITLE: Applied Nutritional Biochemistry

Course outcomes:

Students will be able to:

CO1: Explain the structure of amino acids and proteins, their metabolic pathways, and evaluate nitrogen balance and protein quality indicators.

CO2: Describe the concept of Basal Metabolic Rate (BMR), the factors influencing it, and the thermogenic effect of different nutrients.

CO3: Classify enzymes based on their function, explain their specificity, and analyze the factors that affect enzyme activity.

CO4: Interpret the normal and abnormal composition of urine and explain the mechanisms of water and electrolyte balance and the effects of dehydration.

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(Semester IV)
COURSE CODE: BHSM-4085
COURSE TITLE: Applied Nutritional Biochemistry

Time: 3 Hrs

Marks: 50

Credit (L-T-P): 3-0-0

Instructions for the Paper Setters: Eight questions of equal marks (ten marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT I

Structural formulae of amino acids peptide bonds. Hydrolytic breakdown of protein & essential amino acids, Nitrogen balance, Protein efficiency ratio and biological value of protein. Elementary study of general metabolism of protein, building up of amino acid pool. General reaction of amino acid metabolism, Urea Cycle, Essential amino acids.

UNIT II

B.M.R. – Meaning and factors affecting B.M.R. specific dynamic action of food stuffs.

UNIT III

Enzymes – definition, classification and specificity of enzymes, Factors affecting enzyme activity.

UNIT IV

Urine composition, normal and abnormal constituents of urine, Water and electrolyte balance, water and electrolyte losses and their replenishment effect of dehydration.

Books Suggested

- 1) Nelson, D. L., & Cox, M. M. (2021). *Lehninger principles of biochemistry* (8th ed.). W.H. Freeman and Company.
- 2) Satyanarayana, U., & Chakrapani, U. (2021). *Biochemistry* (5th ed.). Elsevier India.
- 3) Vasudevan, D. M., Sreekumari, S., & Vaidyanathan, K. (2020). *Textbook of biochemistry for medical students* (9th ed.). Jaypee Brothers Medical Publishers.
- 4) Chatterjea, M. N., & Shinde, R. (2020). *Textbook of medical biochemistry* (9th ed.). Jaypee Brothers Medical Publishers.
- 5) Joshi, S. A. (2016). *Nutrition and dietetics* (5th ed.). McGraw-Hill Education.
- 6) Sharma, D. C. (2017). *Nutritional Biochemistry*, CBS Nursing Publishers.
- 7) Voet, D., Voet, J.G. (2012). *Fundamentals of Biochemistry*, John Wiley and Sons, New York.
- 8) Jain, J. L., Jain, S. and Jain. N. (2016). *Fundamentals of Biochemistry*, S. Chand & Company Ltd., New Delhi.

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(Semester IV)
COURSE CODE: BHSM-4085(P)
COURSE TITLE: Applied Nutritional Biochemistry (Practical)

Course outcomes:

Students will be able to:

CO1: Perform qualitative tests to identify monosaccharides, disaccharides, and polysaccharides in various samples.

CO2: Estimate glucose concentration quantitatively using standard biochemical methods.

CO3: Analyze the presence of proteins, fats, and carbohydrates in common food items such as bread, milk, and eggs using biochemical tests.

CO4: Interpret experimental results and demonstrate basic proficiency in biochemical laboratory techniques related to food and biomolecule analysis.

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(Semester IV)
COURSE CODE: BHSM-4085(P)
COURSE TITLE: Applied Nutritional Biochemistry (Practical)

Time: 3 Hrs
Credit (L-T-P): 0-0-1

Marks: 20

1. Qualitative analysis of monosaccharide, disaccharide and polysaccharide.
2. Quantitative estimation of Glucose.
3. To test the reaction of protein fats and carbohydrate in bread, milk and egg.

Books Suggested

- 1) Oser, B. L. (2014). *Hawk's physiological chemistry* (14th ed.). Tata McGraw-Hill.
- 2) Plummer, D. T. (2017). *An introduction to practical biochemistry* (3rd ed.). McGraw-Hill Education.
- 3) Jayaraman, J. (1981). *Laboratory manual in biochemistry*. Wiley Eastern Ltd.
- 4) Sawhney, S. K., & Singh, R. (2019). *Introductory practical biochemistry* (2nd ed.). Narosa Publishing House.