Mangalore University

SCHEME AND SYLLABUS

For the Program

B.Sc. BIOCHEMISTRY with Three Majors

As Per SEP 2024

Academic Year 2024-25 and onwards

Department of Biochemistry
Jnana Kaveri Mangalore University
PG Centre, Chikka Aluvara

B.Sc. BIOCHEMISTRY

Preamble

The learning outcomes are designed to help learners understand the objectives of studying B.Sc. Biochemistry to analyze, appreciate, understand the basic concepts of biomolecular processes and chemical reactions occurring in the living system. This Program is fundamental to tackle many of the health – related challenges facing society. Considering the rapid and far-reaching advances in biological sciences in 21st century, it is imperative to have curriculum incorporating these updated emerging concepts of biochemistry. The current pattern is designed to impart concept based learning with emphasis on hands-on training, skill development and research. The curriculum includes courses encompassing core courses, intra and inter discipline specific courses, skill and ability enhancement courses to impart in-depth knowledge in biochemistry complemented with varied subjects and skills. The course seeks to discover and nurture typical attributes of a competent science graduate such as; spirit of inquiry, critical thinking, problem solving, analytical reasoning, aptitude to research/industry and entrepreneurial instincts.

Programme Learning Outcome

The learning outcome-based curriculum is specific in terms of changes in cognitive and psychomotor behavior of students. Biochemistry Honors course is intended to provide abroad framework enabling students to acquire a skill set that helps them understand and appreciate the field of biochemistry. The structure or design of this framework shall ensure a high standard of the Honors degree in Biochemistry at national level. The programme specifications are intended as a reference point for prospective students, current students, academic in delivering the programme and realizing its objectives.

Keeping in pace with the developmental trends in Biochemistry and allied areas, it is expected that the students undertaking Biochemistry (Honours) course become conversant with the essence of Biochemistry and exhibit certain levels of learning outcomes as proposed below;

PROGRAMME OUTCOME (PO)

PO: 1-To create interest in Biochemistry and appreciation for chemical basis of biological processes.

PO: 2-To inculcate the spirit of inquiry and value of systematic study of a discipline. Provide a general understanding of the related disciplines with a holistic knowledge generation in biological sciences.

PO: 3-Toprovideanin-depthunderstandingofchemicalreactionmechanismsinbiological processes.

PO: 4-To provide a flavor of historical developments of enzymes and their applications in research, diagnostics and various industries.

PO: 5- To gain proficiency in basic laboratory techniques and be able to apply the scientific method to the processes of experimentation, hypothesis testing, data interpretation and logical conclusions.

PO: 6-To develop problem solving and analytical skills through case studies, research papers and hands-on-experience

PO: 7-To appreciate biochemical mechanistic basis of physiological processes, metabolism under normal and pathological conditions importance and levels of metabolic regulations.

PO8- To apply and effectively communicate scientific reasoning and data analysis in both written and oral forms. They will be able to communicate effectively with well-designed posters and slides in talks aimed at scientific audiences as well as the general public.

PO: 9- To bridge the knowledge and skill gap between academic out and industry requirements.

PO: 10- To give students experience in conducting independent, hypothesis-driven, biological research, project planning and management

PO:11-Toprovideskillstopublishresearchfindings,andawarenessofIPrights,and scientific publication ethics and problems of plagiarism.

PO: 12- To prepare competent human resource with better knowledge, hands-on-experience and scientific attitude, at national and global levels for careers in research and development, academia and Pharma-, biotech- and agro-, and food processing industries.

B.Sc.BIOCHEMISTRY

Graduates with strong academic knowledge, discipline-specific and generic skills complemented with social responsibility are greatest asset of the country. The curriculum frame work under SEP for Biochemistry graduates aims to build the following attributes;

- **Disciplinary Knowledge:**
- **Communication Skills:**
- **Critical Thinking:**
- **Problem Solving:**
- **Analytical Reasoning**
- **Research Skills:**
- **Team work and Time Management:**
- **Scientific Reasoning:**
- **Reflective Thinking:**
- **Self-Directing Learning:**
- **Digital Literacy:**
- **Multicultural Competence:**
- **Moral and Ethical Values:**
- **Leadership qualities:**
- **Life-long Learning:**

B.Sc. Degree in Biochemistry
SEMESTER I

Program Name	**B.Sc., Biochemistry**	**Semester**	**I**
Course Title	**Chemical Foundations of Biochemistry**		
Course Code	**BCT 101**	No of Credits	**3**
Contact Hours	56 Hours	Duration of SEA/Exam	3 Hours
Formative Assessment	**20**	Summative Assessment	**80**

Course Outcomes:

CO: 1- To understand the basic principles of biochemistry.
CO: 2- To understand water as solvent of life, importance of buffers in biological systems, atoms and chemical bonding.
CO: 3- To understand fundamentals of physical phenomena associated with adsorption, viscosity, osmotic pressure etc.
CO: 4- To acquire and consolidate the fundamental concepts of kinetics and reaction mechanism
CO: 5- To understand the concepts of colloids and explore its importance in everyday life.

Learning outcomes

This course will enable students to understand basic physical principles of biological systems, measurements in biochemical study, nature of chemical bonds. Also, helps them appreciate the physical properties of molecules, colloids, and basics of chemical kinetics essential for biochemistry.

Course Articulation Matrix Mapping

Course Outcomes	1	2	3	4	5	6	7	8	9	10	11	12
Aptitude	x	x	x	x								
Critical thinking		x								x		x
Subject clarity	x	x					x					x
Analytical Skill	x				x	x				x		

SEMESTER-1

Course title: Chemical Foundations of Biochemistry	**Course credits: 03**
Total contact hours:56 hrs	**Duration of ESA/ Exam: 03 hrs**
Formative Assessment Marks: 20	**Summative Assessment Marks: 80**

BCT 101: Chemical Foundations of Biochemistry **56 Hrs**

UNIT-1 **14 hrs**

1. Overview of Biochemistry: Origin of Biochemistry as a discipline. Definition, scope and significance of Biochemistry. Chemical composition of living organisms.
2. Units and Measurements: SI units, mass, volume, temperature, amount, length and time. atomic weight, molecular weight, equivalent weight, basicity of acids, acidity of bases, Avogadro`s number, molarity, normality, molality, mole concept, concentration, mole to

molar conversion, percentage, density and specific gravity. Errors in quantitative analysis – types, sources and minimizations. Precision and accuracy.

3. Properties of water: Molecular structure of water (VSEPR theory), physical properties of water, its effect on non-polar compounds and biomolecules.
4. Physical properties of molecules: Adsorption -Definition, Freundlich and Langmuir's adsorption isotherm. Applications of adsorption. Viscosity-Definition, Experimental method of measuring viscosity of liquids and solutions by Ostwald's viscometer. Surface tension – Definition and its measurement. Distribution law -Distribution and partition coefficient. Applications of distribution law.

UNIT-2 **14 hrs**

5. Colligative properties: Osmotic pressure and its measurements by Berkely and Hartley's method. Laws of osmotic pressure. Hypo, hyper and isotonic solutions. Effects of osmotic pressure on living cells. Donnan membrane equilibrium.
6. Ionic equilibria: Lewis concept of acids and bases. Ionic product of water. pH scale, buffers, Henderson-Hasselbalch equation, buffer capacity, preparation of acidic and basic buffer solutions. Theory of acid base indicators. Choice of indicators. pH titration curves and isoelectric pH of amino acids. Electrodes (Hydrogen Electrode & Calomel electrode), glass electrode. Conductometric titrations [Strong acid against strong base, weak acid (amino acid) against strong base. Measurement of pKa of amino acids using pH meter.

UNIT-3 **14 hrs**

7. Chemical bonding: Types of bonds& bond characteristics - Ionic, covalent, co-ordinate bonds. Atomic orbitals and molecular orbitals – Molecular Orbital Theory, Linear combination of atomic orbitals, bonding and anti-bonding of molecular orbitals, sp, sp2, sp3 and sp3d2 hybridizations with suitable examples. Sigma and pi bonds with examples. Vander Waal's forces, ion-dipole, dipole – dipole interactions, London forces, hydrophobic interaction, hydrogen bonding. Effect of chemical forces on physical properties Solubility, BP and MP.
8. Co-ordination compounds: Transition metals, properties (Colour, oxidation states, magnetic properties). Co-ordinate bond, double and complex salts – differences with examples. Postulates of Werner's theory. Types of ligands – uni, bi and polydentate with examples. Co- ordination number. Porphyrin nucleus and classification. Important metallo porphyrins occurring in nature-structure and their biological importance (Hb, cytochrome, chlorophyll, VitaminB12). Bile pigments – Types, structure and chemical nature.

UNIT-4 **14 hrs**

9. Chemical kinetics: Introduction, Rate of reactions, rate law or rate equation, molecularity and order of a reaction with examples, velocity constant or rate constant and half-life period expressions for zero, first and second order reactions with derivations (a=b and a $\neq$ b), rate constant of irreversible reaction, kinetics of reversible reaction (without derivation). Numerical problems. Effect of temperature, pressure and catalyst on rate of reaction, Arrhenius equation and Arrhenius interpretation of energy of activation. Transition state theory.

10. Colloids: true solutions, classification, peptisation, purification, ultrafiltration, Brownian movements, electric properties, coagulation, lyophilicsols, lyophobicsols, dialysis-electro and persistent dialysis, addition of electrolytes, colloids in daily life and applications. Emulsion, types, micelles with biomolecules and its biological applications.

Suggested Readings:

1. Advanced Inorganic Chemistry: A comprehensive Text,1999, Cotton A and Geoffrey Wilkinson, 6th edition , Wiley publication
2. Inorganic Chemistry, 2014, Miessler GL, Paul Fischer PJ,and Tarr DA, 5thedition, Pearson Publication.
3. Inorganic Chemistry, 2004, Catherine E and Sharpe AG, ACS publication
4. Inorganic Chemistry, 2015,Overton, Rourke, Weller, Armstrong and Hagerman, Oxford Press
5. PhysicalChemistry:A molecular approach, 2019, Donald A, McQuarrie and Simon JD, Viva Books Publication.
6. P Puri, Sharma, Pathania Text Book of Physical Chemistry,Vishal Publishing Company, 48th Edition, 2022.
7. Puri, Sharma, Pathania Text Book Of Inorganic Chemistry, Vishal Publishing Company, 33rd Edition, 2022.
8. A Guide to Organic Reaction Mechanism-P. Sykes, 6thEdition, Pearson Education, 1986.
9. General & Inorganic Chemistry-R Sarkar, New Central Book Agency; 3rdEdition, 2011.
10. F. A. Cotton &G. Wilkinson. Basic Inorganic Chemistry, John Wiley (1998).
11. Douglas, Mcdaniel and Alexander: Concepts and Models in Inorganic Chemistry, John Wiley, 3rd Edition (1994).
12. James E. Huheey, Ellen Keiter And Richard Keiter: Inorganic Chemistry: Principles Of Structure And Reactivity, Pearson Public, 4thEdition (2013).
13. Pattabhi. V. And Gautham. N. (2002) Biophysics. Narosa Publishing House, India.
14. https://www.mooc.org/
15. https://swayam.gov.in/CEC
16. Physical chemistry 2019, Atkins P, Paula JD, Keeler J , 11th edition , Oxford press.

Pedagogy

Mooc / Desk Work / Book Chapter/ Problem Solving/ Assignment

Formative Assessment

Sl. No.	Continuous Assessment Program/Internal Assessment	Maximum Marks
01	Two Session Tests with proper record for assessment (5+5=10)	**10**
02	Assessment of Skill Development activities/Seminars/Group Discussion/ Assignment etc., with proper record	**05**
03	Attendance with proper record	**05**
	TOTAL MARKS	**20**

SEMESTER-1

PRACTICALS-1

Program Name	**B.Sc., Biochemistry**	**Semester**	**I**
Course Title	**Experimental Biophysical Chemistry**		
Course Code	**BCP 102**	**No of Credits**	**02**
Contact Hours	**04 hrs/week**	**Duration of SEA/Exam**	**3 Hours**
Formative Assessment	**10**	**Summative Assessment**	**40**

BCP 102: Experimental Biophysical Chemistry **32 Hrs**

Learning outcomes:

This course aims to familiarize students with the principles of analytical chemistry and basic analytical techniques such as volumetric analysis. Course objective is to provide skills to apply biophysical/chemical principles to understand biological processes. Also, helps them appreciate the physical properties of molecules, colloids, and basics of chemical kinetics essential for biochemistry.

Experiments:

1. Concept of molarity, molality and normality. Calculation and preparation of molar solutions. (Problems to be given in exams). Calculation and preparation of normal solutions and percent solutions and dilute solutions.
2. Calibration of volumetric glassware (Burette,pipette and volumetric flask).
3. Preparation of standard sodium carbonate solution, standardization of HCl (Methylorange) and estimation of NaOH in the given solution. (Methyl orange orphenolphthalein).
4. Preparation of standard oxalic acid. Standardization of NaOH and estimation of H_2SO_4in the given solution (phenolphthalein).
5. Preparation of standard $K_2Cr_2O_7$. Standardization of $Na_2S_2O_3$and estimation of $CuSO_4$in the given solution.
6. Preparation of $ZnSO_4$. Standardization of EDTA and estimation of total hardness of water using eriochrome black-T indicator.
7. Preparation of standard potassium bipthalate. Standardization of NaOH and estimation of HCl in the given solution. (Phenolphthalein).
8. Calibration of pH meter and Preparation of buffers-acetate, citrate and phosphate buffers.
9. Conductometric titration of strong acid against strong base.
10. Conductometric titration of weak acid (amino acid) against strong base.
11. Determination of rate constant of decomposition of H_2O_2 using $KMnO_4$ by volumetric analysis method.
12. Determination of density and viscosity of the given liquid using specific gravity bottle and Ostwald's viscometer.
13. Determination of density and surface tension of the given liquid using specific gravity bottle and stalagmo meter.

Suggested Readings:

1. Svehla, G.Vogel's Qualitative Inorganic Analysis,Pearson Education, 2012.
2. Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson, 2009.

3. Dr. O. P. Pandey, D.N. Bajpai, Dr. S. Giri, Practical Chemistry, S. Chand and Co.Ltd.,
4. Principles of Practical Chemistry-M.Viswanathan
5. Instrumental Methods of chemical Analysis. B.K. Sharma.
6. Experiments in Physical Chemistry R.C. Das and B. Behra, Tata McGraw Hill
7. Advanced Practical Physical Chemistry J.B. Yadav, Goel Publishing House
8. Advanced Experimental Chemistry. Vol-I J. N. Gurtu and R Kapoor, S.Chand and Co.
9. Practical Chemistry, K. K. Sharma, D. S.Sharma (Vikas Publication).
10. General Chemistry experiment –Anil J Elias (University press).
11. Vogel text book of quantitative chemical analysis , G.H. Jeffery, J.Basset.
12. Quantitative chemical analysis, S.Sahay (S. Chand &Co.).
13. Practical Chemistry Dr O P Pandey, DN Bajpai, Dr S Giri. S.Chand Publication
14. College Practical Chemistry.VK Ahluwalia, Sunitha Dingra, Adarsh Gulati
15. Practical Physical Chemistry-B. Viswanathan, P S Raghavan.MV Learning Publication

Pedagogy:

Mook/Desk work/Book chapter/Problem solving/Assignment

Formative Assessment	
ASSESSMENT OCCASION	**WEIGHTAGE IN MARKS**
Continuous Evaluation and Class Test	05
Record	05
Total	**10**

Summative Assessment	
ASSESSMENT OCCASION	**WEIGHTAGEINMARKS**
Performance of Experiments	30
Viva-voce	10
Total	**40**

B.Sc. Degree in Biochemistry
SEMESTER II

Program Name	**B.Sc. Biochemistry**	**Semester**	**II**
Course Title	**Bio-Organic Chemistry**		
Course Code	**BCT 201**	**No of Credits**	**03**
Contact Hours	**04 Hrs/week**	**Duration of SEA/Exam**	**3 Hours**
Formative Assessment	**20**	**Summative Assessment**	**80**

Course Outcomes:

CO1: To understand the fundamentals of organic chemistry and their importance in understanding Biochemical reactions

CO2:To acquire knowledge of organic reactions, isomerism and Stereochemistry of molecules

Learning outcomes:

This course helps the students to understand the significance of organic reactions and their relevance to biological systems. It helps to gain a good understanding of aliphatic and aromatic compounds, nomenclature, reactivity of functional groups, the importance of stereo isomers in biological systems, and structure activity relationships in bio molecules.

Course Articulation Matrix Mapping

Course Outcomes	1	2	3	4	5	6	7	8	9	10	11	12
Aptitude	x	x	x	x								
Critical thinking		x	x	x	x					x		
Subject clarity	x	x					x					x
AnalyticalSkill	x	x			x	x						

Pedagogy

MOOC/ Desk Work/ Book Chapter/ Problem Solving/Assignment

Formative Assessment

Sl. No.	Continuous Assessment Programme / Internal Assessment	Maximum Marks
01	Two Session Tests with proper record for assessment (5+5=10)	10
02	Assessment of Skill Development activities/Seminars/Group Discussion/ Assignment etc., with proper record	05
03	Attendance with proper record	05
	Total Marks	20

BCT 201: Bio-Organic Chemistry **56 hours**

UNIT-I 14 Hours

1. Introduction to organic chemistry: Classification of organic compounds, unique characteristics, IUPAC nomenclature of organic compounds (including bi-functional) and biomolecules.
2. Hydrocarbons: Markownikoff and anti-Markownikoff addition. Addition of HBr to propene. Alkenes – Ozonolysis, oxidation. Dienes – types with examples, 1, 3 butadiene–Preparations, stability and mechanism of addition of HBr. Diels-Alder reaction. Conformational analysis of ethane.
3. Reaction mechanisms: Concept of inductive effect, resonance and hyper conjugation. Classification of organic reactions (substitution, addition, elimination and rearrangement), with one examples for each. Concepts of the following –carbanions, carbocations, free radicals, carbenes, nucleophiles and electrophiles (Formation and Stability).
4. Alkyl halides and organometallic compounds: SN^1, $SN^2$and SN^i reactions, their mechanism with one example for each. Concept of elimination reactions (E_1, $E_2$and E_{1CB} with an example). Organometallic compounds – definition and applications of organo lead, organo lithium, cis-platin molecules

UNIT-II **14 Hours**

5. Arenes: Structure of benzene – by Resonance and Molecular orbital theories.

Aromaticity (Huckel's rule). Mechanism of Nitration and Friedel- craft reaction. Electronic interpretation of the orientating influence of substituents in the electrophilic substitution of toluene, chlorobenzene, nitrobenzene and phenol. Resonance structures of naphthalene and anthracene.

6. Stereochemistry: Stereoisomerism, types, Fischer-projection formulae, chiral carbon atom, asymmetry and dissymmetry, chirality, conditions for optical isomerism ex: glyceraldehyde, lactic acid, tartaric acid, Nomenclature of enantiomers, diastereomers. Epimers and anomers. D and L notation, R and S system, racemization and resolution (Biochemical, chemical and physical methods). Geometrical isomerism. E and Z notations. Stereochemistry in Biological systems

UNIT-III **14 Hours**

7. Cycloalkanes: Reactivity and relative stability. Bayer's strain theory. Sachse-Mohr theory. Boat and chair forms of cyclohexanes. Axial and equatorial bonds and their relation with biological activities of carbohydrates (Ex. Glucose)
8. Alcohols: Definition, classification, monohydric alcohols-distinguishing reactions for primary, secondary and tertiary alcohols. Dihydric alcohols: Glycol, preparation (any 2 methods) and uses. Trihydric alcohols: Glycerol, synthesis from propene, properties, (reaction with conc. H_2SO_4, HNO_3, Oxalic acid and HI). Phenols: Acidity of phenols, effect of substituent on acidity.
9. Hydroxy acids and dicarboxylic acids: Structure & biological importance of hydroxy acids: Lactic acid, citric acid and isocitric acid. Dicarboxylic acid: Maleic and fumaric acid. Keto acids: Pyruvic, α-ketoglutaric, oxaloacetic acids and acetoacetic acid
10. Carbonyl compounds: General properties. Aldehydes and ketones. Keto-enol tautomerism, Mechanism: Claisen and aldol condensations. Quinones: Biologically important quinones.
11. Amines: Classification, properties, functional amino group – Basicity of amines, acylation. Reactions with HNO_2& Schiff's base formation. Distinguishing reactions of primary, secondary and tertiary amines.

UNIT-IV **14 Hours**

12. Heterocyclic compounds: Definition, classification with examples, structure and biological importance of furan, pyrrole, thiophene, pyridine, pyran, thiazole, pyrimidine, purine, indole, imidazole, quinoline and isoquinoline. Basicity of pyrrole and pyridine.
13. Terpenes: Definition, isoprene rule, classification, isolation, structure and biological importance of menthol, camphor, farnesol, phytol, lanosterol, lycopene and dolichols.
14. Steroids: Basic ring structure in steroids. Structure and biological importance of cholesterol, phytosterols and ergosterol. Bile acids [Mono, Di & Tri cholic acids].
15. Alkaloids: Definition, classification based on their structure and biological functions, isolation, structure and biological action of morphine, nicotine & atropine. Chemical synthesis of nicotine and atropine.
16. Drugs: Classification of drugs; synthesis and uses of sulphanil amide and paracetamol. Antibiotics: Definition; types; sources; structures and antimicrobial spectrum of action of penicillin, chloroamphenicol, streptomycin and tetracyclines.

SEMESTER II

PRACTICAL-II

Program Name	B.Sc. Biochemistry	Semester	II
Course Title	Experimental Bioorganic Chemistry		
Course Code	BCP 202	No of Credits	2
Contact Hours	32 Hours	Duration of SEA/Exam	3 Hours
Formative Assessment	10	Summative Assessment	40

Learning outcomes:

This laboratory course is aimed at imparting skills of identifying organic compounds, demonstrating reactivity of various functional groups, and synthesis of simple organic compounds of biological importance.

BCP 202: Experimental Bioorganic Chemistry 32 Hours

1. Systematic qualitative analysis of the organic compounds: Urea, benzamide, benzaldehyde, aniline, acetophenone, nitrobenzene, chlorobenzene, benzoic acid, salicylic acid, resorcinol, and ethyl acetate.

2. Organic preparations: Aspirin from salicylic acid, benzoic acid from benzaldehyde, and meta-dinitrobenzene from nitrobenzene.

Suggested Readings:

1. Arun Bahl and B.S. Bahl: Advanced Organic Chemistry, S. Chand. (2019)
2. L. Finar: Organic Chemistry (Vol. I & II), E.L.B.S.(2002)
3. R. T. Morrison &R. N. Boyd :Organic Chemistry, Prentice Hall.(2011)
4. Stereochemistry of organic compounds: Principles, and applications D. Nashi puri, New York : Wiley 1991.
5. Basic Stereochemistry of Organic Compounds-S. Sengupta, 2nd Edition,Oxford University Press, 2018.
6. A Guide to Organic Reaction Mechanism-P. Sykes, 6th Edition, Pearson Educaton,1986.
7. https://www.mooc.org/
8. https://swayam.gov.in/CEC

B.Sc. Degree in Biochemistry

Scheme of Examination

Title of the paper	Contact hours/ week	Exam. hour	IA	Marks	Total Marks	Credits
First Semester						
Biochemistry-I: BCT 101 **Chemical Foundations of Biochemistry**	4	3	20	80	100	3
Biochemistry Practical-I:BCP-102 **Experimental Biophysical Chemistry**	4	3	10	40	50	2
Second Semester						
Biochemistry-II:BCT 201 **Bioorganic Chemistry**	4	3	20	80	100	3
Biochemistry Practical-II:BCP 202 **Experimental Bioorganic Chemistry**	4	3	10	40	50	2

Theory question paper pattern:

Each theory question paper has three Sections;

1. 25% of the marks seeking short answers; Student has to answer all the questions of marks each.
2. 37.5% of marks seeking medium size answers: Student has to answer 6 out of 8 questions of 6 marks each.
3. 37.5% of question seeking comprehensive answers: Student has to answer 3 out of 4 questions of 10 marks each. These questions may include sub questions (5+5).

Internal Assessment: Tests: 10 Marks (two internal tests to be conducted and average is considered for assessment)

UNDERGRADUATE B.Sc. SEMESTER
I&II QUESTION PAPER MODEL

BIOCHEMISTRY

Practical proper Examination I&II semesters

Duration: 3Hrs

- Experimentation (Major &Minor/Spotters) - 30 Marks
- Viva-Voice - 10 Marks

Total 40 Marks

Internal Assessment for Practical Paper I-VI semesters

- Attendance - 05Marks
- Record/Journal - 05Marks

Total 10 Marks

Continuous Assessment Programme / Internal Assessment /Formative Assessment for Major program/Subject: Biochemistry

Sl. No.	Continuous Assessment Programme / Internal Assessment	Maximum Marks
01	Two Session Tests with proper record for assessment (5+5=10)	**10**
02	Assessment of Skill Development activities/Seminars/Group Discussion/Assignment etc., with proper record	**05**
03	• Attendance with proper record	**05**
TOTALMARKS		**20**

- **Attendance Marks-breakup**

<75% - 00Marks
75-80%- 01Mark
80-85%- 02Marks
85-90%- 03Marks
90-95%- 04Marks
>95%- 05Marks

THEORY EXAMINATION QUESTION PAPER PATTERN FOR MAJOR COURSE/SUB

JECT: BIOCHEMISTRY
(Semesters I & II)

B.Sc. Semester-I Degree Examination; 2024-25
(Semester Scheme; New Syllabus: 2024-25)

SUBJECT: BIOCHEMISTRY

Paper –_____: _____
Paper Code: _____

Time: 3Hours **Max.Marks:80**

Instructions to candidates:

1) All sections are compulsory
2) Draw neat and labeled diagrams wherever necessary.

SECTION-A

1. Answer **all** the following questions: **(2×10=20)**

a)

b)

c)

a)

b)

c)

d)

e)

f)

g)

SECTION-B

Answer any **SIX** of the following: **(5×6=30)**

2. From Unit-I

3. From Unit-I

4. From Unit-II

5. From Unit-II

6. From Unit-III

7. From Unit-III

8. From Unit-IV

9. From Unit-IV

SECTION-C

Answer **Any Three** of the following: **(10×3=30)**

10. From Unit-I

11. From Unit-II

12. From Unit-III

13. From Unit-IV

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