

Wep
New

DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM & MARKING SCHEME

B.Sc. I, II, III, IV Semester

BIOCHEMISTRY

(Based on Choice Based Credit System)

SESSION : 2025-26



ESTD : 1958

**GOVT. V.Y.T. PG AUTONOMOUS COLLEGE,
DURG, 491001 (C.G.)**

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A⁺, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

Phone : 0788-2212030

Website - www.govtsciencecollegedurg.ac.in, Email – autonomousdurg2013@gmail.com

FOUR YEAR UNDERGRADUATE PROGRAM (NEP-2020)**Program: Bachelor in Science (2024 -28)****DISCIPLINE – BIOCHEMISTRY****Session – 2024 -25**

DSC -01 to 08		DSE -01 to 12	
Code	Title	Code	Title
BCSC -01T	Introductory Biochemistry and Biomolecules	BCSE -01T	Clinical Biochemistry
BCSC -01P	Introductory Biochemistry and Biomolecules	BCSE -01P	Clinical Biochemistry
BCSC -02T	Bioanalytical Techniques	BCSE -02T	Biology of Infectious Diseases
BCSC -02P	Bioanalytical Techniques	BCSE -02P	Biology of Infectious Diseases
BCSC -03T	Enzymology	BCSE -03T	Biotechnology
BCSC -03P	Enzymology	BCSE -03P	Biotechnology
BCSC -04T	Intermediary Metabolism	BCSE -04T	Plant Biochemistry
BCSC -04P	Intermediary Metabolism	BCSE -04P	Plant Biochemistry
BCSC -05T	Gene replication, expression and regulation	BCSE -05T	Human Physiology
BCSC -05P	Gene replication, expression and regulation	BCSE -05P	Human Physiology
BCSC -06T	Biochemistry and Function of Hormones	BCSE -06T	Cell Biology
BCSC -06P	Biochemistry and Function of Hormones	BCSE -06P	Cell Biology
BCSC -07T	Immunology	BCSE -07T	Microbial Biochemistry
BCSC -07P	Immunology	BCSE -07P	Microbial Biochemistry
BCSC -08T	Nutraceutical Biochemistry and Functional Foods	BCSE -08T	Nutritional and Environmental Biochemistry
BCSC -08P	Nutraceutical Biochemistry and Functional Foods	BCSE -08P	Nutritional and Environmental Biochemistry
		BCSE -09T	Bioinformatics
		BCSE -09P	Bioinformatics
		BCSE -10T	Industrial Biochemistry
		BCSE -10P	Industrial Biochemistry
		BCSE -11T	Entrepreneurship Development
		BCSE -11P	Entrepreneurship Development
		BCSE -12T	Research Methodology
		BCSE -12P	Research Methodology
GE -01 & 02		VAC	
BCGE -01T	Introductory Biochemistry and Biomolecules	BCVAC-01	Ethno medicine in Chhattisgarh
BCGE -01P	Introductory Biochemistry and Biomolecules	SEC	
BCGE -02T	Bioanalytical Techniques	BCSEC-01	Biostatistics
BCGE -02P	Bioanalytical Techniques		

Name and Signature of Convener & Members of CBoS:

11/06/2024
 (Dr. Mrigendra Kumar Dwivedi)

11/6
 Representative
 Comm.

11/6
 Representative
 Comm.

Programme Educational Objectives:

PEO 1: The graduating student shall become a professional assistant in the area of biochemistry.

PEO 2: The graduating student shall become a researcher in the field of biochemistry.

PEO 3: The graduating student will become an entrepreneur or a consultant or a freelancer in the area of biochemistry.

Program Outcome:

On successful completion of this program the graduates shall have:

PO1.	Knowledge: A knowledge of contemporary issues related to biochemistry. Ability to demonstrate the fundamental knowledge of molecules of life, molecular techniques, toxicology in the area of biochemistry.
PO2.	Critical Thinking and Reasoning: Ability to think critically and apply the same to update scientific knowledge.
PO3.	Problem Solving: Ability to identify, formulate and solve professional problems in the area of biochemistry, experimental skill and critical thinking, students will be capable of addressing intricate societal and industrial challenges.
PO4.	Advanced Analytical and Computational Skills: Ability to design experiment and interpret the results. An ability to design a system, or process to meet desired need within realistic constraints
PO5.	Effective Communication: An ability to communicate effectively in scientific reasoning and data analysis in both written and oral forms.
PO6.	Social/ Interdisciplinary Interaction: Ability to function in a multidisciplinary team.
PO7.	Self-directed and Life-long Learning: A recognition of the needed for and an ability to engage in lifelong learning in the area of biochemistry.
PO8.	Effective Citizenship: Leadership and Innovation: An ability to use the techniques, skills and modern professional tools necessary for professional practice and for research.
PO9.	Ethics: An understanding of professional and ethical responsibility in the area of biochemistry.
PO10.	Further Education or Employment and Global Perspective: The broad education necessary to understand the impact of solutions in a global, economic, environmental and societal context.

Program Specific Objectives:

PSO1.	Students shall be able to identify, formulate and solve the problems of biological metabolisms, protein biochemistry and molecular biology.
PSO2.	Students shall be able to conduct the experiments in the field of medicine, toxicology and immunology as well as to analyses and interpret the results.
PSO3.	Students shall be able to use the biochemical techniques, bioinformatics tools, biostatistics, skills and modern pathological tools necessary for professional practice and for research.

Name and Signature of Convener & Members of CBOs:



 Dr. Smasen (Dr.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
Department of Biochemistry
Course Curriculum

PART- A: Introduction			
Program: Bachelor in Science (Certificate / Diploma / Degree/Honors)		Semester - I	Session: 2024-2025
1	Course Code	BCSC – 01 T	
2	Course Title	Introductory Biochemistry and Biomolecules	
3	Course Type	Discipline Specific Course (Theory)	
4	Pre-requisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	<i>After completion of the course, the students would be able to:</i> ➤ Understand the history of Biochemistry and key contributions of Indian scientists. ➤ Understand the properties of carbohydrates, proteins, lipids, cholesterol, DNA, RNA and their importance in biological systems. ➤ Understand the methods of determination of amino acid & Proteins. ➤ Understand the structure and function of determination of DNA & RNA.	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	General understanding of Biochemical Molecular Logic of Life. Definition. Experiments and discoveries of Acharya Nagarjuna. Famous Indian and foreign Biochemists and their inventions/ Discoveries. Importance of Yog, Pranayam, food and healthy lifestyle for balance of biochemical (kaf, vat, pitta) of our body and role in maintaining good mental and physical health. Biochemical basis of Lifestyle disorders.		09
II	Structure and functions of Carbohydrates and lipids: Definition, classification, biological importance. Monosaccharides: Stereochemistry of monosaccharides, (+) and (-), D and L, epimers, anomers Disaccharides: Establishment of structures of sucrose and lactose and maltose. Polysaccharides: Partial structure, occurrence and importance of starch, glycogen, inulin, cellulose, chitine. heparin, hyaluronic acid. Lipids: Classification and biological role. Fatty acids – Nomenclature of saturated and unsaturated fatty acids. Phosphoglycerides: Structure and function of lecithin, cephalins, phosphatidylinositol, plasmalogens, and cardiolipin Structure and importance of sphingomyelin, gangliosides and cerebroside.		12
III	Structure and functions of Amino acids and Proteins: Structure and classification of amino acids based on polarity. Amino acids D & L notation. Peptides: Peptide bond, structure and biological importance. Proteins: Peptides, Primary Structure of proteins, N- and C- terminal amino acids, Secondary Structure – α Helix. β -sheet, β -bend. Tertiary and quaternary structure, denaturation and renaturation of proteins.		12
IV	Structure and functions of Nucleic acids: Composition of DNA and RNA. Nucleosides and nucleotides. Chargaff's rule. Primary and secondary structure of DNA, Watson and Crick model of DNA. Melting of DNA (T_m).		12
Keywords	Biomolecules, Carbohydrate, Lipids, Fatty acids, Nucleotides, Nucleosides, Nucleic acids,		

Name and Signature of Convener & Members of CBoS:






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PART-C: Learning Resources**Text Books, Reference Books and Others*****Text Books Recommended –***

- Nelson, Cox and Lehninger Principles of Biochemistry, 7th Edition
- Medical Biochemistry By Styanarayan.

Online Resources–

- **e-Resources / e-books and e-learning portals**
- <https://www.britannica.com/>
- <https://en.wikibooks.org/wiki/Biochemistry>
- <https://www.pdfdrive.com/biomolecules-books.html>
- <https://byjus.com/biology/biomolecules/>
- <https://www.vedantu.com/biology/biomolecules>

PART -D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:****Maximum Marks:** 100 Marks**Continuous Internal Assessment (CIA):** 30 Marks**End Semester Exam (ESE):** 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10 Total Marks - 30	
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

The image shows several handwritten signatures in blue ink. One signature is clearly legible as 'Neha' with a surname that is partially obscured. Other signatures are more stylized and difficult to decipher. The signatures are written over a white background.

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

Department of Biochemistry

Course Curriculum

PART- A: Introduction			
Program: Bachelor in Science (Certificate / Diploma / Degree/Honors)		Semester - I	Session: 2024-2025
1	Course Code	BCSC – 01 P	
2	Course Title	Introductory Biochemistry and Biomolecules	
3	Course Type	Discipline Specific Course (Practical)	
4	Pre-requisite (if, any)	As per the Program	
5	Course Learning Outcomes (CLO)	<i>On successful completion of the course, the student shall be able to:</i> ➤ Describe the basic lab requirements and their uses. ➤ Analyze the characteristics of the compound on the basis of their pH. ➤ Formulate to prepare normal, molar and stock solution. ➤ Estimate Biomolecules in mixture.	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	➤ Safety measures in laboratories. ➤ Preparation of normal, molar and stock solution. ➤ Preparation of buffers. ➤ Qualitative tests for carbohydrates, lipids, amino acids, proteins and nucleic acids. ➤ Separation of amino acids/ sugars/ bases by Paper / Thin layer chromatography. ➤ Estimation of vitamin C titrimetric method. ➤ Determination of saponification value and iodine number of fats. ➤ Short write-ups on disease privations practices in Indian Knowledge system.		30
Keywords	Laboratory Safety, Estimation, Sugar, Fat, Proteins		

Name and Signature of Convener & Members of CBoS:












PART-C: Learning Resources**Text Books, Reference Books and Others****Text Books Recommended –**

- Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox,
- Experimental Biochemistry by Beedu Shashidhar Rao

Online Resources–

- e-Resources / e-books and e-learning portals
- <https://en.wikibooks.org/wiki/Biochemistry>
- <https://www.pdfdrive.com/biomolecules-books.html>
- <https://ncert.nic.in/textbook.php>

PART -D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:**

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance - 05 Total Marks - 15	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment	Managed by
	A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:










FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

Department of Biochemistry

Course Curriculum

PART- A: Introduction			
Program: Bachelor in Science (Certificate / Diploma / Degree / Honors)		Semester - II	Session: 2024-2025
1	Course Code	BCSC - 02T	
2	Course Title	Bio-analytical Techniques	
3	Course Type	Discipline Specific Course (Theory)	
4	Pre-requisite (if, any)	As per the Program	
5	Course Learning Outcomes (CLO)	On successful completion of the course, the student shall be able to: ➤ Understand basic concepts of Spectroscopy. ➤ Describe amino acids with application of chromatography. ➤ Understand basic concepts of centrifugation. ➤ Understand working principle, instrumentation and applications of various electrophoretic techniques.	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Spectroscopy - Concepts of spectroscopy, Laws of photometry. Beer-Lambert's law, Principles and applications of colorimetry. Visible and UV spectroscopy. Electrophoretic techniques – Principles of electrophoretic separation. Types of electrophoresis including paper and gel. PAGE and SDS-PAGE. Isoelectric focussing.		12
II	Chromatography – Principles and applications of paper, thin layer, ion exchange, affinity, gel permeation, adsorption and partition chromatography. HPLC and FPLC.		09
III	Centrifugation – Principle of centrifugation, concepts of RCF, different types of instruments and rotors, preparative, differential and density gradient centrifugation, analytical, ultra-centrifugation, determination of molecular weights and other applications.		12
IV	Microscopy – Bright field, Dark field, Phase contrast and Fluorescence microscopy Transmission and scanning microscopy, freeze fracture techniques, specific staining of biological materials Immunological Techniques: Immuno diffusion, immune electrophoresis, radioimmunoassay, ELISA, Immuno fluorescence.		12
Keywords	Spectroscopy, Chromatography, Centrifugation, Electrophoresis, Microscope, ELISA.		

Name and Signature of Convener & Members of CBoS:










PART-C: Learning Resources**Text Books, Reference Books and Others****Text Books Recommended –**

- K Wilson and John Walker Practical Biochemistry: Principles & Techniques
- RF Boyer Biochemistry Laboratory: Modern Theory & Techniques
- Physical biochemistry by D Friefelder, WH Freeman & Co., USA.
- Biophysical Chemistry By Upahyaya & Nath

Online Resources–

- e-Resources / e-books and e-learning portals
- <https://en.wikibooks.org/wiki/Biochemistry>
- <https://www.pdfdrive.com/biomolecules-books.html>
- <https://ncert.nic.in/textbook.php>

PART -D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:****Maximum Marks: 100 Marks****Continuous Internal Assessment (CIA): 30 Marks****End Semester Exam (ESE): 70 Marks**

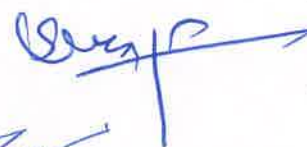
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10	
	Total Marks - 30	
End Semester Exam (ESE):	Two section – A & B	
	Section A: Q1. Objective – 10 x1= 10 Mark ; Q2. Short answer type- 5x4 =20 Marks	
	Section B: Descriptive answer type qts., 1out of 2 from each unit- 4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:






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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

Department of Biochemistry

Course Curriculum

PART- A: Introduction			
Program: Bachelor in Science (Certificate / Diploma / Degree/ Honors)		Semester -II	Session: 2024-2025
1	Course Code	BCSC- 02P	
2	Course Title	Bioanalytical Techniques	
3	Course Type	Discipline Specific Course (Practical)	
4	Pre-requisite (if, any)	As Per the Program	
5	Course Learning Outcomes (CLO)	On successful completion of the course, the student shall be able to: ➤ Examine different components present in the extract of radish leaves by using chromatography technique. ➤ Analysis independently of various biomolecules in the laboratory. ➤ Demonstrate the effect of inorganic compound and its percent purities in various types of samples. ➤ Analyze characteristics of UV absorption spectra of by different methods in samples in different biomolecules.	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	➤ Verification of Beer-Lambert's law. ➤ Separation of sugars using paper chromatography. ➤ Separation of amino acids by paper chromatography ➤ Differential centrifugation of cell organelles ➤ SDS-PAGE gel electrophoresis of protein ➤ Separation of plant pigments by Paper chromatography ➤ Estimation of DNA and RNA.		30
Keywords	Spectroscopy, Estimation, Quantitative, Separation, Techniques		

Name and Signature of Convener & Members of CBOS:



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PART-C: Learning Resources**Text Books, Reference Books and Others****Text Books Recommended –**

- K Wilson and John Walker Practical Biochemistry: Principles & Techniques
- RF Boyer Biochemistry Laboratory: Modern Theory & Techniques
- Physical biochemistry by D Friefelder, WH Freeman & Co., USA.
- Biophysical Chemistry By Upahyaya & Nath

Online Resources–

- e-Resources / e-books and e-learning portals
- <https://en.wikibooks.org/wiki/Biochemistry>
- <https://www.pdfdrive.com/biomolecules-books.html>
- <https://ncert.nic.in/textbook.php>

PART -D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:****Maximum Marks: 50 Marks****Continuous Internal Assessment (CIA): 15 Marks****End Semester Exam (ESE): 35 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance - 05	
	Total Marks - 15	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment	
	A. Performed the Task based on lab. work - 20 Marks	Managed by Course teacher as per lab. status
	B. Spotting based on tools & technology (written) – 10 Marks	
	C. Viva-voce (based on principle/technology) - 05 Marks	




 Name and Signature of Convener & Members of CBoS:




FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
Department of Biochemistry
Course Curriculum

PART- A: Introduction			
Program: Bachelor in Science (Diploma / Degree / Honors)		Semester - III	Session: 2024-2025
1	Course Code	BCSC- 03 T	
2	Course Title	Enzymology	
3	Course Type	Discipline Specific Course (Theory)	
4	Pre-requisite (if, any)	As Per the Program	
5	Course Learning Outcomes (CLO)	On successful completion of the course, the student shall be able to: ➤ Describe the enzyme catalysis and regulatory enzymes. ➤ Explain the mechanism of action of enzymes and role of vitamins as coenzyme precursors. ➤ Express the Michaelis-Menten equation, and double reciprocal plots, and graphical representation of various inhibitors. ➤ Describe the principles and methods of Diagnosis by enzymes.	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Introduction to enzymes: Nature of enzymes - protein and non-protein (ribozyme). Cofactor and prosthetic group, apoenzyme, holoenzyme. IUBMB classification of enzymes. Coenzymes. Features of enzyme catalysis Catalytic power and specificity of enzymes (concept of active site), Fischer's lock and key hypothesis, Koshland's induced fit hypothesis		09
II	Enzyme kinetics: Relationship between initial velocity and substrate concentration, steady state kinetics, equilibrium constant - Mono substrate reactions. Michaelis-Menten equation, Lineweaver-Burk plot, Km and Vmax, K _{cat} and turnover number. Effect of pH, temperature and metal ions on the activity of enzyme.		12
III	Enzyme inhibition: Reversible inhibition (competitive, uncompetitive, non-competitive, mixed and substrate). Mechanism based inhibitors. Mechanism of action of enzymes - General features - proximity and orientation, strain and distortion, acid base and covalent catalysis (chymotrypsin, lysozyme).		12
IV	Regulation of enzyme activity: Control of activities of single enzymes (end product inhibition) and metabolic pathways, feedback inhibition (aspartate transcarbamoylase), reversible covalent modification phosphorylation (glycogen phosphorylase). Proteolytic cleavage- zymogen. Multienzyme complex as regulatory enzymes, pyruvate dehydrogenase. Isoenzymes - properties and physiological significance (lactate dehydrogenase). Application of enzymes in diagnostics: (SGPT, SGOT, creatine kinase, alkaline and acid phosphatases), Enzyme electrodes, biosensors.		12
Keywords		Coenzyme, Ribozyme, Cofactor, Apoenzyme, Michaelis-Menten equation.	

Name and Signature of Convener & Members of CBoS:






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PART-C: Learning Resources**Text Books, Reference Books and Others****Text Books Recommended –**

- Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H.Freeman and Company (New York), ISBN:13: 978-1-4641-0962-1 / ISBN:10:1-4292-3414-8.
- Biochemistry (2011) 4th ed., Donald, V. and Judith G.V., John Wiley & Sons Asia Pvt.Ltd. (New Jersey), ISBN:978-1180-25024.
- Fundamentals of Enzymology (1999) 3rd ed., Nicholas C.P. and Lewis S., OxfordUniversity Press Inc. (New York), ISBN:0 19 850229 X.

Online Resources–**e-Resources / e-books and e-learning portals**

- <https://www.jbc.org/Enzymology>
- <https://www.sciencedirect.com/topics/medicine-and-dentistry/enzymology>
- <https://www.biologyonline.com/dictionary/coenzyme>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3770912/>
- <https://www.eposters.net/redirect/?ID=16026&UID=0&Type=poster>
- https://link.springer.com/chapter/10.1007/978-0-387-35141-4_34

PART -D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:****Maximum Marks:** 100 Marks**Continuous Internal Assessment (CIA):** 30 Marks**End Semester Exam (ESE):** 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2):	20 +20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar -	10	
	Total Marks -	30	
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks		

Name and Signature of Convener & Members of CBoS:









FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

Department of Biochemistry

Course Curriculum

PART- A: Introduction			
Program: Bachelor in Science (Diploma / Degree/ Honors)		Semester -III	Session: 2024-2025
1	Course Code	BCSC- 03 P	
2	Course Title	Enzymology	
3	Course Type	Discipline Specific Course (Practical)	
4	Pre-requisite (if, any)	As Per the Program	
5	Course Learning Outcomes (CLO)	On successful completion of the course, the student shall be able to: ➤ Explain purification of proteins by various methods. ➤ Estimate enzyme activity by different methods. ➤ Explain progress curve of enzyme. ➤ Practice the effect of physical parameters on enzyme activity.	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	➤ Partial purification of acid/ alkaline phosphatase. ➤ Assay of enzyme activity and specific activity, e.g. acid/ alkaline phosphatase. ➤ Effect of pH on enzyme activity and determination of optimum pH. ➤ Determination of Km and Vmax using Lineweaver-Burk graph. ➤ Isolation and purification of urease. ➤ Inhibition of alkaline/acid phosphatase activity by EDTA ➤ Effect of substrate concentration on alkaline phosphatase activity and determine of its Km value. ➤ Effect of temperature of enzyme activity and determination of activation energy. ➤ Effect of enzyme concentration on enzyme activity.		30
Keywords	Assay, Enzyme, Specific activity, Temperature,		

Name and Signature of Convener & Members of CBoS:



 Convener: 

 Members: 







 Neha Sharma

PART-C: Learning Resources**Text Books, Reference Books and Others****Text Books Recommended –**

- Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13: 978-1-4641-0962-1 / ISBN:10:1-4292- 3414-8.
- Biochemistry (2011) 4th ed., Donald, V. and Judith G.V., John Wiley & Sons Asia Pvt. Ltd. (New Jersey), ISBN:978-1180-25024.
- Fundamentals of Enzymology (1999) 3rd ed., Nicholas C.P. and Lewis S., Oxford University Press Inc. (New York), ISBN:0 19 850229 X.

Online Resources–

- e-Resources / e-books and e-learning portals
- <https://en.wikibooks.org/wiki/Biochemistry>
- <https://www.pdfdrive.com/biomolecules-books.html>
- <https://ncert.nic.in/textbook.php>

PART -D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:****Maximum Marks: 50 Marks****Continuous Internal Assessment (CIA): 15 Marks****End Semester Exam (ESE): 35 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance - 05	
	Total Marks - 15	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment	
	A. Performed the Task based on lab. work - 20 Marks	Managed by Course teacher as per lab. status
	B. Spotting based on tools & technology (written) – 10 Marks	
	C. Viva-voce (based on principle/technology) - 05 Marks	










Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
Department of Biochemistry
Course Curriculum

PART- A: Introduction			
Program: Bachelor in Science (Diploma / Degree / Honors)		Semester - III	Session: 2024-2025
1	Course Code	BCSE- 01 T	
2	Course Title	Clinical Biochemistry	
3	Course Type	Discipline Specific Elective (Theory)	
4	Pre-requisite (if, any)	As per the Program	
5	Course Learning Outcomes (CLO)	<i>On successful completion of the course, the student shall be able to:</i> ➤ Learn about the normal constituents of urine, blood and their significance in maintaining good health. ➤ Understand the mechanisms of causation of diseases of liver, kidney and of Cancer. ➤ Describe with the variations in the levels of triglycerides and lipoproteins and their relationship with various diseases. ➤ Explain with the role of enzymes in diagnosis of various diseases.	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART-B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Urine: Normal composition of urine – volume, pH, colour, specific gravity. Constituents-urea, uric acid, creatinine, pigment. Abnormal constituents – glucose, albumin, ketone bodies, variations in urea, creatinine, pigments and their clinical significance in brief. Abnormalities in Nitrogen Metabolism – Uremia, hyperuricemia, porphyria and factors affecting nitrogen balance.		09
II	Blood: Normal constituents of blood and their variation in pathological conditions - urea, uric acid, creatinine, glucose, bilirubin, total protein, albumin/globulin ratio. Lipid profile cholesterol, triglycerides, lipoproteins - HDL and LDL. Blood Clotting – Disturbances in blood clotting mechanisms – haemorrhagic disorders – haemophilia, von Willebrand's disease, purpura, Rendu-Osler-Werber disease, thrombotic thrombocytopenic purpura, disseminated intravascular coagulation, acquired prothrombin complex disorders, circulating anticoagulants.		12
III	Diagnostic Enzymes – Enzymes in health and diseases. Biochemical diagnosis of diseases by enzyme assays – SGOT, SGPT, alkaline phosphatase, CPK, cholinesterase, LDH Disorders of liver and kidney – Jaundice, fatty liver, normal and abnormal functions of liver and kidney. Inulin and urea clearance. Electrolytes and acid-base balance – Regulation of electrolyte content of body fluids and maintenance of pH, reabsorption of electrolytes.		12
IV	Biochemistry of Cancer, Cellular differentiation in cancer, carcinogens and cancer therapy Inborn errors of metabolism: Sickle cell anaemia, phenyl ketonuria, Neimann – Pick disease and Gaucher's disease.		12
Keywords		Blood, Urine, Cancer, Enzymes, Diseases	

Name and Signature of Convener & Members of CBoS:



PART-C: Learning Resources**Text Books, Reference Books and Others****Text Books Recommended –**

- Concise Medical Physiology – Choudhary – New Central Book Agency – Calcutta.
- TextBook of Medical Physiology – Guyton – Prism Books Pvt. Ltd. – Bangalore.
- Harper's Biochemistry – Murray, Granner, Mayes, and Rodwell – Prentice Hall International Inc.
- Textbook of medical physiology: A. C. Gyton, and J. E HallSaunders Elsevier Publications, A division of Reed Elsevier India Pvt .Ltd.New Delhi ISBN 81-8147-084-2
- T.M. Delvin (editor), Text book of biochemistry with clinical correlation, (1982), John Wiley & Sons Inc. USA.

Online Resources–**e-Resources / e-books and e-learning portals**

- <https://www.sciencedirect.com/topics/medicine-and-dentistry/enzymology>
- <https://www.jbc.org/Enzymology>
- <https://www.biologyonline.com/dictionary/coenzyme>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3770912/>
- <https://www.eposters.net/redirect/?ID=16026&UID=0&Type=poster>
- https://link.springer.com/chapter/10.1007/978-0-387-35141-4_34

PART -D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:****Maximum Marks: 100 Marks****Continuous Internal Assessment (CIA): 30 Marks****End Semester Exam (ESE): 70 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10	
	Total Marks - 30	
End Semester Exam (ESE):	Two section – A & B	
	Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBOS:

Convener








FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

Department of Biochemistry

Course Curriculum

PART- A: Introduction			
Program: Bachelor in Science (Diploma / Degree / Honors)		Semester - III	Session: 2024-2025
1	Course Code	BCSE-01 P	
2	Course Title	Clinical Biochemistry	
3	Course Type	Discipline Specific Elective (Practical)	
4	Pre-requisite (if, any)	As Per the Program	
5	Course Learning Outcomes (CLO)	On successful completion of the course, the student shall be able to: ➤ Understand Qualitative and quantitative analysis of constituents of biological fluids such as urine, blood and their estimation using standard methods.	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course	➤ Qualitative and quantitative analysis of urine : proteins, Bence-Jones proteins, Cl⁻, Ca²⁺ ➤ Qualitative analysis of abnormal constituents in urine - glucose, albumin, bile pigments, bile salts and ketone bodies. ➤ Separation of Blood Plasma and Serum ➤ Determination of A/G ratio in serum ➤ Isolation and estimation of serum cholesterol ➤ Serum enzyme assays: alkaline phosphatase, SGOT, SGPT ➤ Estimation of bilirubin (conjugated and unconjugated) in serum. ➤ Estimation of total lipids in serum by vanillin method. ➤ Estimation of cholesterol in serum. ➤ Estimation of blood urea nitrogen from plasma. ➤ Estimation of SGPT and SGOT in serum. ➤ Preparation of starch from potato and its hydrolysis by salivary amylase. a. Determination of achromatic point in salivary amylase. b. Effect of sodium chloride on amylases	30
Keywords	Blood, Plasma, Liver function test, Serum enzymes	

Name and Signature of Convener & Members of CBOS:

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PART-C: Learning Resources**Text Books, Reference Books and Others****Text Books Recommended –**

- Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13: 978-1-4641-0962-1 / ISBN:10:1-4292- 3414-8.
- Biochemistry (2011) 4th ed., Donald, V. and Judith G.V., John Wiley & Sons Asia Pvt. Ltd. (New Jersey), ISBN:978-1180-25024.
- Fundamentals of Enzymology (1999) 3rd ed., Nicholas C.P. and Lewis S., Oxford University Press Inc. (New York), ISBN:0 19 850229 X.

Online Resources–

- **e-Resources / e-books and e-learning portals**
<https://www.thermofisher.com/in/en/home/references/protocols/cell-and-tissue-analysis/elisa-protocol/elisa-sample-preparation-protocols/plasma-and-serum-preparation.html>
- <https://labmonk.com/determination-of-sgot-and-sgpt>
- <https://www.labcorp.com/help/patient-test-info/total-protein-and-albumin/globulin-ag-ratio>
- <https://link.springer.com/article/10.1007/s101570200005>
- <https://icp.bmj.com/content/iclinpath/6/3/173.full.pdf>

PART -D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:****Maximum Marks: 50 Marks****Continuous Internal Assessment (CIA): 15 Marks****End Semester Exam (ESE): 35 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance - 05	
	Total Marks - 15	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment	
	A. Performed the Task based on lab. work - 20 Marks	Managed by Course teacher as per lab. status
	B. Spotting based on tools & technology (written) – 10 Marks	
	C. Viva-voce (based on principle/technology) - 05 Marks	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
Department of Biochemistry
Course Curriculum

PART- A: Introduction			
Program: Bachelor in Science (Diploma / Degree / Honors)		Semester - IV	Session: 2024-2025
1	Course Code	BCSC-04 T	
2	Course Title	Intermediary Metabolism	
3	Course Type	Discipline Specific Theory	
4	Pre-requisite (if, any)	As Per the Course	
5	Course Learning Outcomes (CLO)	On successful completion of the course, the student shall be able to: ➤ Acquire the knowledge of energy production in living systems by the degradation of fatty acids. ➤ Explain the various pathways of fatty acid synthesis in living systems. ➤ Explain the mechanism of the machinery system involved in carbohydrate metabolism. ➤ Describe breakdown and synthesis of Amino acids and nucleotides in humans and recognize its relevance with respect to nutrition and human diseases.	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Carbohydrate Metabolism : Reactions and energetics of glycolysis. Alcoholic and lactic acid fermentations. Reactions and energetic of TCA Cycle. Gluconeogenesis, glycogenesis and glycogenolysis. Reaction and Physiological significance of pentose phosphate pathway. Regulation of Glycolysis and TCA cycle.		12
II	Electron Transport Chain and Oxidative Phosphorylation : Structure of mitochondria, sequence of electron carriers, sites of ATP production, inhibitors of electron transport chain. Hypothesis of mitochondrial Oxidative phosphorylation. Transport of reducing potentials into mitochondria.		09
III	Lipid Metabolism : Introduction, hydrolysis of triacylglycerols, transport of fatty acids into Mitochondria, β oxidation saturated fatty acids, ATP yield from fatty acid Oxidation. Biosynthesis of saturated and unsaturated fatty acids. Metabolism of Ketone bodies, oxidation of unsaturated and odd chain fatty acids. Biosynthesis of triglycerides and important phospholipids, glycolipids.		12
IV	Amino acid Metabolism: General reactions of amino acid metabolism: transamination, oxidative Deamination and decarboxylation. Urea cycle. Degradation and biosynthesis of Amino acids. Glycogenic and ketogenic amino acids. Nucleotide Metabolism: Sources of the atoms in the purine and pyrimidine molecules. Biosynthesis and Degradation of purines and pyrimidines .		12
Keywords	Glycolysis, Oxidative Phosphorylation, Oxidation, Urea cycle, Nucleotides, Porphyrins.		

Name and Signature of Convener & Members of CBoS:

(Signatures of Convener and Members of CBoS)

PART-C: Learning Resources**Text Books, Reference Books and Others****Text Books Recommended –**

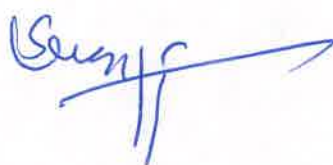
- Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13:978-1-4641-0962-1 / ISBN:10:1-4641-0962-1.
- Textbook of Biochemistry with Clinical Correlations (2011) 7th ed., Devlin, T.M., John Wiley & Sons, Inc. (New Jersey), ISBN:978-0-470-28173-4.
- Biochemistry (2012) 7th ed., Berg, J.M., Tymoczko, J.L. and Stryer L., W.H. Freeman and Company (New York), ISBN:10:1-4292-2936-5, ISBN:13:978-1-4292-2936-4.

Online Resources–**e-Resources / e-books and e-learning portals**

- <https://www.britannica.com/science/metabolism>
- <https://www.sciencedirect.com/science/article/pii/S0009912013001677>
- <https://pubmed.ncbi.nlm.nih.gov/23720291/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3243375/>

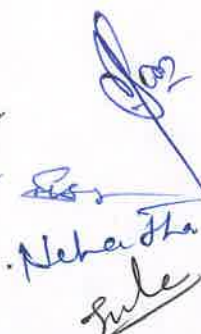
PART -D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:****Maximum Marks: 100 Marks****Continuous Internal Assessment (CIA): 30 Marks****End Semester Exam (ESE): 70 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit-4x10=40 Marks	



Name and Signature of Convener & Members of CBOS:





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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

Department of Biochemistry

Course Curriculum

PART- A: Introduction			
Program: Bachelor in Science (Diploma / Degree/ Honors)		Semester - IV	Session: 2024-2025
1	Course Code	BCSC- 04 P	
2	Course Title	Intermediary Metabolism	
3	Course Type	Discipline Specific Course (Practical)	
4	Pre-requisite (if, any)	As Per the Program	
5	Course Learning Outcomes (CLO)	<i>On successful completion of the course, the student shall be able to:</i> ➤ Describe the importance of lipids as storage molecules and as structural component of biomembranes. ➤ Explain the importance of high energy compounds , synthesis of ATP under aerobic and anaerobic conditions. ➤ Explain the role of TCA cycle in central carbon metabolism, importance of anaplerotic reactions and redox balance. ➤ Explain perturbations in the carbon metabolism can lead to various disorders such as diabetes and cancer.	
6	Credit Value	1 Credits	<i>Credit =30 Hours Laboratory or Field learning/Training</i>
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	➤ To understand the concepts of preparation of buffers. ➤ To estimate biomolecules such as glucose, proteins, cholesterol in clinical samples. ➤ To isolate of lipids from egg. ➤ Estimation of salivary amylase ➤ Separation of Blood Plasma and Serum ➤ Estimation of proteins from serum by biuret and Lowry methods. ➤ Estimation of bilirubin (conjugated and unconjugated) in serum. ➤ Estimation of cholesterol in serum. ➤ Estimation of blood urea nitrogen from plasma. ➤ Preparation of starch from potato and its hydrolysis by salivary amylase. ➤ Determination of achromatic point in salivary amylase. ➤ Effect of sodium chloride on amylases.		30
Keywords	Serum, Plasma, lipids, enzymes estimation, quantitative		

Name and Signature of Convener & Members of CBoS:



PART-C: Learning Resources**Text Books, Reference Books and Others****Text Books Recommended –**

- Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13:978-1-4641-0962-1 / ISBN:10:1-4641-0962-1.
- Textbook of Biochemistry with Clinical Correlations (2011) 7th ed., Devlin, T.M., John Wiley & Sons, Inc. (New Jersey), ISBN:978-0-470-28173-4.
- Biochemistry (2012) 7th ed., Berg, J.M., Tymoczko, J.L. and Stryer L., W.H. Freeman and Company (New York), ISBN:10:1-4292-2936-5, ISBN:13:978-1-4292-2936-4.

Online Resources–

- e-Resources / e-books and e-learning portals
- <https://link.springer.com/article/10.1007/s00217-008-0998-4>
- https://www.cdc.gov/nchs/data/nhanes/nhanes_03_04/113_c_met_lipids.pdf

PART -D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:****Maximum Marks: 50 Marks****Continuous Internal Assessment (CIA): 15 Marks****End Semester Exam (ESE): 35 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar + Attendance - 05	
	Total Marks - 15	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment	
	A. Performed the Task based on lab. work - 20 Marks	
	B. Spotting based on tools & technology (written) – 10 Marks	
	C. Viva-voce (based on principle/technology) - 05 Marks	
	Managed by Course teacher as per lab. status	









Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

Department of Biochemistry Course Curriculum

PART- A: Introduction			
Program: Bachelor in Science (Diploma / Degree/Honors)		Semester - IV	Session: 2024-2025
1	Course Code	BCSE-02 T	
2	Course Title	Biology of Infectious Diseases	
3	Course Type	Discipline Specific Elective (Theory)	
4	Pre-requisite (if, any)	As Per Program	
5	Course Learning Outcomes (CLO)	On successful completion of the course, the student shall be able to: ➤ Understand various classes of microbial infectious agents, their mode of action, biology of the diseases, transmission of diseases, the concepts of treatment, and drug resistance for various antimicrobial agents. ➤ Demonstrate molecular basis of diagnosis and treatment of diseases as well as strategies for development of vaccines against these diseases. ➤ Explain the details of important infectious diseases such as tuberculosis, AIDS, malaria, filariasis, etc. ➤ Understand the significance of hygiene, sanitation, vaccination in prevention of infectious diseases.	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Infectious diseases: Classification, Nosocomial infections; Past and present emerging and re-emerging infectious diseases and pathogens. Source, reservoir and transmission of pathogens. Safety measures when working with pathogens, biosafety levels, infection and evasion. Fungal diseases: Etiology, characteristics and diagnosis of Candidiasis, Sporotrichosis, Aspergillosis and Ring worm.		09
II	Bacterial diseases: classification of bacterial pathogens, virulence factors and host pathogen interaction. Bacterial toxins, enterotoxins and their mode of action, diarrhea, cholera; Tuberculosis, infection and pathogenicity, diagnostics, therapeutics and vaccines, drug resistance. Other bacterial diseases such as - Typhoid, Tetanus, Anthrax and Pneumonia; their virulence factors and host pathogen interactions.		14
III	Viral diseases: Structure and classification of viruses, viral virulence factors, host pathogen interactions; AIDS: history, causative agent, pathogenesis, diagnostics, drugs; Other viral diseases such as Hepatitis, Influenza, Rabies, Dengue and Polio; Chicken Pox, Herpes Virus.		12
IV	Parasitic diseases: Classes of parasites and diseases caused by them, Malaria: causative agents, vectors, etiology, diagnostics, drugs, vaccine development. Role of drugs, vaccines and sanitation in prevention and treatment of infectious diseases.		10
Keywords	Infection, Disease, Prevention, Precaution		

Name and Signature of Convener & Members of CBoS:

PART-C: Learning Resources**Text Books, Reference Books and Others****Text Books Recommended –**

- Jawetz, Melnick and Adelbergs Medical Microbiology 27th ed., McGraw Hill Education
- Klien's Microbiology (2008) 7th ed., Prescott, Harley, Wiley, J.M., Sherwood, L.M., Woolverton, C.J. McGraw Hill International Edition (New York)
- Sherris Medical Microbiology: An introduction to infectious diseases (2010) 4. Kenneth J. Ryan, C., George Ray, Publisher: McGraw-Hill. E-learning Resources

Online Resources–**e-Resources / e-books and e-learning portals**

- <https://www.britannica.com/science/metabolism>
- <https://www.sciencedirect.com/science/article/pii/S0009912013001677>
- <https://pubmed.ncbi.nlm.nih.gov/23720291/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3243375/>

PART -D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:****Maximum Marks: 100 Marks****Continuous Internal Assessment (CIA): 30 Marks****End Semester Exam (ESE): 70 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	








Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

Department of Biochemistry

Course Curriculum

PART- A: Introduction			
Program: Bachelor in Science (Diploma / Degree/ Honors)		Semester - IV	Session: 2024-2025
1	Course Code	BCSE- 02 P	
2	Course Title	Biology of Infectious Diseases	
3	Course Type	Discipline Specific Elective- Practical	
4	Pre-requisite (if, any)	As Per the Program	
5	Course Learning Outcomes (CLO)	➤ Students will acquire the knowledge to isolate bacteria from water/sewage samples, to stain bacteria, fungi, acid fast bacilli and to perform important diagnostic tests for infectious diseases such as WIDAL test. ➤ Students will be exposed to permanent slides of pathogens in order to get hands-on training to know nature of various pathogens causing diseases.	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	➤ Grams staining for bacteria ➤ Isolation and culture of bacteria from water/sewage samples. ➤ Demonstration of various media for bacterial culture ➤ Isolation and enumeration of bacteriophages (PFU) from water/sewage samples ➤ WIDAL test ➤ Acid fast staining ➤ Permanent slides of pathogens: Mycobacterium tuberculosis, Leishmania, Plasmodium falciparum ➤ Fungal staining		30
Keywords	Diagnostic tests, Infection identification, Methods		

Name and Signature of Convener & Members of CBoS:

The block contains several handwritten signatures in blue and green ink. Some signatures are accompanied by dates, such as '19/4' and '19/01'. The signatures are written over a white background.

