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)**	*On successful completion of the course, the student shall be able to:* ➢ 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 trigycerides 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, vriations 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** 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**	

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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-, Ca+2 ➢ 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:

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-albuminglobulin-ag-ratio
- https://link.springer.com/article/10.1007/s101570200005
- https://jcp.bmj.com/content/jclinpath/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** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
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: