

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)	<p><i>On successful completion of the course, the student shall be able to:</i></p> <ul style="list-style-type: none"> ➤ 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	<i>Credit = 15 Hours - learning & Observation</i>
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:

PART-C: Learning Resources		
Text Books, Reference Books and Others		
Text Books Recommended –		
<ul style="list-style-type: none"> ➤ 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., JohnWiley& 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. Freemanand 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		
<ul style="list-style-type: none"> ➤ 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	

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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)	<p><i>On successful completion of the course, the student shall be able to:</i></p> <ul style="list-style-type: none"> ➤ 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	<ul style="list-style-type: none"> ➤ 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		




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Online Resources–		
<ul style="list-style-type: none"> ➤ 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
	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	

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