DIPLOMA IN PHARMACY – 2nd YEAR
LESSON PLAN
BIOCHEMISTRY & CLINICAL PATHOLOGY – THEORY

Course Code: ER20-23T **75 Hours (3 Hours/week)**

Name of Tutor/Teacher: Sh. Mohd. Hamid, Guest Faculty in Pharmacy

Sh. Dalbir Singh, Senior Lecturer in Pharmacy (Tutorial)

Schedule of Classes: Theory: Monday: 12.00 – 01.00 PM, Monday: 02.00 – 03.00 PM,
Wednesday: 02.00 – 03.00 PM, Wednesday: 03.00 – 04.00 PM (Tutorial)

Scope: This course is designed to impart basic knowledge on the study of structure and functions of biomolecules and the chemical processes associated with living cells in normal and abnormal states. The course also emphasizes on the clinical pathology of blood and urine.

Course Objectives: This course will discuss the following at the fundamental level

1. Structure and functions of biomolecules.
2. Catalytic activity, diagnostic and therapeutic importance of enzymes.
3. Metabolic pathways of biomolecules in health and illness (metabolic disorders).
4. Biochemical principles of organ function tests and their clinical significance.
5. Qualitative and quantitative determination of biomolecules/metabolites in the biological sample.
6. Clinical pathology of blood and urine.

Course Outcomes: Upon successful completion of this course, the students will beable to

CO2.3T.1: Describe the functions of biomolecules

CO2.3T.2: Discuss the various functions of enzymes in the human system

CO2.3T.3: Explain the metabolic pathways of biomolecules in both physiological and pathological conditions

CO2.3T.4: Describe the principles of organ function tests and their clinical significances

CO2.3T.5: Determine the biomolecules/metabolites in the given biological samples, both qualitatively and quantitatively

CO2.3T.6: Describe the clinical pathology of blood and urine

Chapter	Topic	Date	Hour	CO	PO	Coverage	Reason for discrepancy	Plans for compensation in backlog	Taught by	Verified by
1 Introduction to Biochemistry	Scope of biochemistry in Pharmacy		**1**							
	Cell and its biochemical organization		**2**							
2 Carbohydrates	Definition, classification with examples, chemical properties		**1**							
	Monosaccharides - Structure of glucose, fructose, and galactose		**2**							
	Disaccharides - structure of maltose, lactose, and sucrose		**3**							
	Polysaccharides - chemical nature of starch and glycogen		**4**							
	Qualitative tests and biological role of carbohydrates		**5**							
3 Proteins	Definition, classification of proteins based on composition and solubility with examples		**1**							
	Definition, classification of amino acids based on chemical nature and nutritional requirements with examples		**2**							
	Structure of proteins (four levels of organization of protein structure)		**3**							
	Qualitative tests and biological role of proteins and amino acids		**4**							
	Diseases related to malnutrition of proteins		**5**							
4 Lipids	Definition, classification with examples		**1**							
	Structure and properties of triglycerides (oils and fats)		**2**							
	Fatty acid classification – Based on chemical and nutritional requirements with examples		**3**							
	Structure and functions of cholesterol in the body		**4**							
	Lipoproteins - types, composition and functions in the body		**5**							
	Qualitative tests and functions of lipids		**6**							

Chapter	Topic	Date	Hour	CO	PO	Coverage	Reason for discrepancy	Plans for compensation in backlog	Taught by	Verified by
5 Nucleic acids	Definition, purine and pyrimidine bases		**1**							
	Components of nucleosides and nucleotides with examples		**2**							
	Structure of DNA (Watson and Crick model) and functions		**3**							
	Structure of RNA and functions		**4**							
6 Enzymes	Definition, properties and IUB and MB classification		**1**							
	Factors affecting enzyme activity		**2**							
	Mechanism of action of enzymes, Enzyme inhibitors-1		**3**							
	Mechanism of action of enzymes, Enzyme inhibitors-2		**4**							
	Therapeutic and pharmaceutical importance of enzymes		**5**							
7 Vitamins	Definition and classification with examples		**1**							
			2							
	Sources, chemical nature, functions, coenzyme form, recommended dietary requirements, deficiency diseases of fat-and water-soluble vitamins		**3**							
			4							
			5							
			6							
8 Metabolism (Study of cycle/pathways without chemical structures)	***Metabolism of Carbohydrates***: Glycolysis		**1**							
	TCA cycle		**2**							
	Glycogen metabolism		**3**							
	Regulation of blood glucose level		**4**							
	Diseases related to abnormal metabolism of Carbohydrates		**5**							
			6							
	Metabolism of lipids: Lipolysis		**7**							

Chapter	Topic	Date	Hour	CO	PO	Coverage	Reason for discrepancy	Plans for compensation in backlog	Taught by	Verified by
8 Metabolism (Study of cycle/pathways without chemical structures)	β-oxidation of Fatty acid (Palmitic acid)		**8**							
	Ketogenesis and ketolysis		**9**							
	Diseases related to abnormal metabolism of lipids such as Ketoacidosis		**10**							
	Fatty liver, Hypercholesterolemia		**11**							
	Metabolism of Amino acids (Proteins): General reactions of amino acids and its significance- Transamination		**12**							
	Deamination		**13**							
	Urea cycle and decarboxylation		**14**							
	Diseases related to abnormal metabolism of amino acids		**15**							
			16							
	Disorders of ammonia metabolism, phenylketonuria,		**17**							
	alkaptonuria and Jaundice.		**18**							
	Biological oxidation: Electron transport chain and		**19**							
	Oxidative phosphorylation		**20**							
9 Minerals	***Minerals:*** Types,		**1**							
	Functions,		**2**							
	Deficiency diseases		**3**							
			4							
	recommended dietary requirements		**5**							

Chapter	Topic	Date	Hour	CO	PO	Coverage	Reason for discrepancy	Plans for compensation in backlog	Taught by	Verified by
10 Water and Electrolytes	Distribution, functions of water in the body		**1**							
	Water turnover and balance		**2**							
	Electrolyte composition of the body fluids, Dietary intake of electrolyte and Electrolyte balance		**3**							
	Dehydration, causes of dehydration and oral rehydration therapy		**4**							
			5							
11	Introduction to Biotechnology		**1**							
12 Organ function tests	Functions of ***kidney*** and routinely performed tests to assess the functions of kidney and their clinical significances		**1**							
			2							
	Functions of ***liver*** and routinely performed tests to assess the functions of liver and their clinical significances		**3**							
			4							
	Lipid profile tests and its clinical significances		**5**							
			6							
12 Introduction to Pathology of Blood and Urine	Lymphocytes and Platelets, their role in health and disease		**1**							
			2							
	Erythrocytes - Abnormal cells and their significance		**3**							
			4							
	Normal and Abnormal constituents of Urine and their significance		**5**							
			6							

BIOCHEMISTRY & CLINICAL PATHOLOGY – PRACTICAL

Course Code: ER20-23P **50 Hours (2 Hours/week/Batch)**

Name of Tutor/Teacher: Sh. Dalbir Singh, Senior Lecturer in Pharmacy (Tutorial)

Schedule of Classes: Practical: Monday: 09.00 – 11.00 AM, Wednesday: 09.00 – 11.00 AM, Tuesday: 09.00 – 11.00 AM

Scope: This course is designed to train the students in the qualitative testing of various biomolecules and testing of biological samples for determination of normal and abnormal constituents.

Course Objectives: This course will train and provide hands-on experiences on thefollowing

1. Qualitative determination of biomolecules/metabolites in simulated biological samples.
2. Determination of normal and abnormal constituents of simulated blood andurine samples.

Course Outcomes: Upon successful completion of this course, the students will be able to

CO2.3P.1: Qualitatively determine the biomolecules/metabolites in the given biological samples.

CO2.3P.2: Determine the normal and abnormal constituents in blood and urine samples and interpret the results of such testing.

CO2.3P.3: Study the various Biochemical reactions.

Exp. No.	Experiment	Batch	Date	CO	PO	Coverage	Reason for discrepancy	Plans for compensation in backlog	Taught by	Verified by
1	Qualitative analysis of carbohydrates-1	A								
		B								
		C								
2	Qualitative analysis of carbohydrates-2	A								
		B								
		C								
3	Qualitative analysis of carbohydrates-3	A								
		B								
		C								
4	Qualitative analysis of carbohydrates-4	A								
		B								
		C								
5	Qualitative analysis of Proteins and amino acids-1	A								
		B								
		C								
6	Qualitative analysis of Proteins and amino acids-2	A								
		B								
		C								
7	Qualitative analysis of Proteins and amino acids-3	A								
		B								
		C								
8	Qualitative analysis of Proteins and amino acids-4	A								
		B								
		C								
9	Qualitative analysis of lipids-1	A								
		B								
		C								
10	Qualitative analysis of lipids-2	A								
		B								
		C								

Exp. No.	Experiment	Batch	Date	CO	PO	Coverage	Reason for discrepancy	Plans for compensation in backlog	Taught by	Verified by
11	Qualitative analysis of urine for normal and abnormal constituents-1	A								
		B								
		C								
12	Qualitative analysis of urine for normal and abnormal constituents – 2	A								
		B								
		C								
13	Qualitative analysis of urine for normal and abnormal constituents-	A								
		B								
		C								
14	Qualitative analysis of urine for normal and abnormal constituents-4	A								
		B								
		C								
15	Determination of constituents of urine (glucose, creatinine, chlorides)1	A								
		B								
		C								
16	Determination of constituents of urine (glucose, creatinine, chlorides)2	A								
		B								
		C								
17	Determination of constituents of urine (glucose, creatinine, chlorides)3	3A								
		B								
		C								
18	Determination of constituents of blood/serum (simulated) (Creatine, glucose,cholesterol, Calcium, Urea, SGOT/SGPT)-1	A								
		B								
		C								
19	Determination of constituents of blood/serum (simulated) (Creatine, glucose,cholesterol, Calcium, Urea, SGOT/SGPT)-2	A								
		B								
		C								
20	Determination of constituents of blood/serum (simulated) (Creatine, glucose,cholesterol, Calcium, Urea, SGOT/SGPT)-3	A								
		B								
		C								
21	Determination of constituents of blood/serum (simulated) (Creatine, glucose,cholesterol, Calcium, Urea, SGOT/SGPT)-4	A								
		B								
		C								
22	Determination of constituents of blood/serum (simulated) (Creatine, glucose,cholesterol, Calcium, Urea, SGOT/SGPT)-5	A								
		B								
		C								

Exp. No.	Experiment	Batch	Date	CO	PO	Coverage	Reason for discrepancy	Plans for compensation in backlog	Taught by	Verified by
23	Determination of constituents of blood/serum (simulated) (Creatine, glucose, cholesterol, Calcium, Urea, SGOT/SGPT)	A								
		B								
		C								
24	Study the hydrolysis of starch from acid and salivary amylase enzyme-1	A								
		B								
		C								
25	Study the hydrolysis of starch from acid and salivary amylase enzyme-2	A								
		B								
		C								

Assignments

The students shall be asked to submit written assignments on Various Pathology Lab Reports (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student).

Recommended Books (Latest Edition)

1. Essentials of Biochemistry by U. Satyanarayana, Books and Allied (P) Ltd.
2. A Textbook of Biochemistry by A.V.S.S. Rama Rao, UBS Publishers' Distributors Pvt. Ltd.
3. Practical Biochemistry by R.C. Gupta and S. Bhargava.
4. Laboratory manual of Biochemistry by Pattabiraman and Sitaram Acharya

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