GUJARAT TECHNOLOGICAL UNIVERSITY
Pharm.D.1s
tyear

SubjectName: Medicinal Biochemistry
SubjectCode:818803

Scope of the Subject: Applied biochemistry deals with complete understanding of the molecular level of the chemical process associated with living cells. Clinical chemistry deals with the study of chemical aspects of human life in health and illness and the application of chemical laboratory methods to diagnosis, control of treatment, and prevention of diseases.

Objectives of the Subject (Know, do, appreciate) : The objective of the present course is providing biochemical facts and the principles to the students of pharmacy. Upon completion of the subject student shall be able to –

a. understand the catalytic activity of enzymes and importance of iso enzymes in diagnosis of diseases;

b. know the metabolic process of biomolecules in health and illness (metabolic disorders);

c. understand the genetic organization of mammalian genome; protein synthesis; replication; mutation and repair mechanism;

d. know the biochemical principles of organ function tests of kidney, liver and endocrine gland; and

e. do the qualitative analysis and determination of biomolecules in the body fluids.

TeachingScheme (Hours)				**EvaluationScheme(Marks)**				**TotalMarks**
Theory	**Tutorial**	**Practical**	**Total**	**Theory**		**Practical**		
				External	**Internal**	**External**	**Internal**	
3	1	3	7	70	30	70	30	200

Sr. No.	**CourseContents**	**Hours**	**ModuleWeightage**
1	**Introduction to biochemistry:** Cell and its biochemical organization, transport process across the cell membranes. Energy rich compounds; ATP, Cyclic AMP and their biological significance.	**5**	**5.5%**
2	**Enzymes**: Definition; Nomenclature; IUB classification; Factor affecting enzyme activity; Enzyme action; enzyme inhibition. Isoenzymes and their therapeutic and diagnostic applications; Coenzymes and their biochemical role and deficiency diseases.	**7**	**8%**
3	**Carbohydrate metabolism**: Glycolysis, Citric acid cycle (TCA cycle), HMP shunt, Glycogenolysis, gluconeogenesis, glycogenesis. Metabolic disorders of carbohydrate metabolism (diabetes mellitus and glycogen storage diseases); Glucose, Galactose tolerance test and their significance; hormonal regulation of carbohydrate metabolism.	**16**	**18%**
4	**Lipid metabolism:** Oxidation of saturated (-oxidation); Ketogenesis and ketolysis; biosynthesis of fatty acids, lipids; metabolism of cholesterol; Hormonal regulation of lipid metabolism. Defective metabolism of lipids (Atheroslerosis, fatty liver, hypercholesterolmiea)	**12**	**13%**
5	**Biological oxidation:** Coenzyme system involved in Biological oxidation. Electron transport chain (its mechanism in energy capture; regulation and inhibition); Uncouplers of ETC; Oxidative phosphorylation;	**7**	**8%**

6	**Protein and amino acid metabolism:** protein turn over; nitrogen balance; Catabolism of Amino acids (Transamination, deamination & decarboxylation). Urea cycle and its metabolic disorders; production of bile pigments; hyperbilirubinemia, porphoria, jaundice. Metabolic disorder of Amino acids.	**12**	**13%**
7	**Nucleic acid metabolism:** Metabolism of purine and pyrimidine nucleotides; Protein synthesis; Genetic code; inhibition of protein synthesis; mutation and repair mechanism; DNA replication (semiconservative /onion peel models) and DNA repair mechanism.	**10**	**11%**
8	**Introduction to clinical chemistry: Cell**; composition; malfunction; Roll of the clinical chemistry laboratory.	**2**	**2%**
9	**The kidney function tests:** Role of kidney; Laboratory tests for normal function includes- a) Urine analysis (macroscopic and physical examination, quantitative and semiquantitative tests.) b) Test for NPN constituents. (Creatinine /urea clearance, determination of blood and urine creatinine, urea and uric acid) c) Urine concentration test d) Urinary tract calculi. (stones)	**5**	**5.5%**
10	**Liver function tests:** Physiological role of liver, metabolic, storage, excretory, protective, circulatory functions and function in blood coagulation. a) Test for hepatic dysfunction-Bile pigments metabolism. b) Test for hepatic function test- Serum bilirubin, urine bilirubin, and urine urobilinogen. c) Dye tests of excretory function. d) Tests based upon abnormalities of serum proteins. Selected enzyme tests.	**5**	**5.5%**
11	**Lipid profile tests:** Lipoproteins, composition, functions. Determination of serum lipids, total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides.	**3**	**3.5%**
12	**Immunochemical techniques** for determination of hormone levels and protein levels in serum for endocrine diseases and infectious diseases. Radio immuno assay (RIA) and Enzyme Linked Immuno Sorbent Assay (ELISA)	**3**	**3.5%**
13	**Electrolytes:** Body water, compartments, water balance, and electrolyte distrubution. Determination of sodium, calcium potassium, chlorides, bicarbonates in the body fluids.	**3**	**3.5%**

CourseMaterials: (Latest edition)

Text books (Theory)

a. Harpers review of biochemistry - Martin
b. Text book of biochemistry – D.Satyanarayana
c. Text book of clinical chemistry- Alex kaplan &Laverve L.Szabo

Reference books (Theory)

a. Principles of biochemistry -- Lehninger
b. Text book of biochemistry -- Ramarao
c. Practical Biochemistry-David T.Plummer.
d. Practical Biochemistry-Pattabhiraman.

Pharm.D.
1styear
MEDICINAL BIOCHEMISTRY

Practical (3 Hours/ Week, 6 Credits, 90 Hours)

Sr. No.	Experiments
1	Qualitative analysis of normal constituents of urine.*
2	Qualitative analysis of abnormal constituents of urine.*
3	Quantitative estimation of urine sugar by Benedict's reagent method.**
4	Quantitative estimation of urine chlorides by Volhard's method.**
5	Quantitative estimation of urine creatinine by Jaffe's method.**
6	Quantitative estimation of urine calcium by precipitation method.**
7	Quantitative estimation of serum cholesterol by Libermann Burchard's method.**
8	Preparation of Folin Wu filtrate from blood.*
9	Quantitative estimation of blood creatinine.**
10	Quantitative estimation of blood sugar Folin-Wu tube method.**
11	Estimation of SGOT in serum.**
12	Estimation of SGPT in serum.**
13	Estimation of Urea in Serum.**
14	Estimation of Proteins in Serum.**
15	Determination of serum bilirubin**
16	Determination of Glucose by means of Glucoseoxidase.**
17	Enzymatic hydrolysis of Glycogen/Starch by Amylases.**
18	Study of factors affecting Enzyme activity. (pH & Temp.)**
19	Preparation of standard buffer solutions and its pH measurements (any two)*
20	Experiment on lipid profile tests**
21	Determination of sodium,calcium and potassium in serum.**

** indicate major experiments & * indicate minor experiment

Referencebooks (Practical)

a. Practical Biochemistry-DavidT.Plummer.
b. Practical Biochemistry-Pattabhiraman.

Assignments:

Format of the assignment

1. Minimum & Maximum number of pages.
2. It shall be computer draft copy.
3. Reference(s) shall be included at the end.
4. Name and signature of the student.
5. Assignment can be a combined presentation at the end of the academic year.
6. Time allocated for presentation may be 8+2 Min.

Scheme of Practical Examination

	Internal/Sessional	External
Synopsis	05	15
MajorExperiment	10	25
MinorExperiment	03	15
Viva	02	15
Max.marks	**20**	**70**
Duration	**3 hours**	**4 hours**

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).