

Semester V

Biochemistry

Objectives:

This course will enable students to:

1. Know the fundamentals of metabolic processes / pathways occurring in the body.
2. Understand the significance of various metabolic processes / pathways.
3. Understand the integration of these metabolic processes.
4. Develop the ability to apply the significance of these processes to different physiological / metabolic conditions.

Subject	Total Credits	Th	Pr	Int	Ext	Total
Biochemistry	4	3	1	25	75	100

Biochemistry Theory

Module No.	Objectives	Content	Evaluation
1	<p>This module will enable students to:</p> <ol style="list-style-type: none">1. Understand the various ways of carbohydrate utilization in the body.2. Create awareness of regulation of the pathways.3. Realize the significance of the pathways.4. Understand the process of energy yield from the organic substrates.	<p>Carbohydrate metabolism:</p> <ul style="list-style-type: none">• Various Biological pathways -- site, significance, intermediates with chemical structures, enzymes, coenzymes involved, Regulation and energetic• Glycolysis, TCA [Kreb's cycle], Pentose phosphate pathway Gluconeogenesis, Glycogenesis Glycogenolysis.• Alcohol metabolism and biochemical alterations in alcoholism• Biological oxidation and electron transport chain	<p>25 marks</p> <p>Power point presentations/ Assignments / Displays on various pathways</p>

<p>2</p>	<p>This module will enable students to:</p> <ol style="list-style-type: none"> 1. Understand the various ways of utilization of lipids in the body. 2. Create awareness of regulation of the pathways. 3. Realize the significance of the pathways. 	<p>Lipid Metabolism:</p> <ul style="list-style-type: none"> • Lipogenesis and Lipolysis • Oxidation of saturated, unsaturated and odd chain fatty acids, regulation. energetics • Biosynthesis of fatty acids, regulation of synthesis. • Elongation and desaturation of fatty acid chains <ul style="list-style-type: none"> • Ketosis and Ketogenesis • Triglycerides synthesis --- Intestinal resynthesis of triglycerides, synthesis in Liver. • Introduction of Cholesterol – Parent steroid sources, Cholesterol biosynthesis with structures, mode of utilization, Control of cholesterol metabolism • Plasma Lipoproteins, Metabolism of Chylomicrons, LDL, HDL and VLDL 	<p>25 marks</p> <p>Power point presentations/ Assignments/ Displays on various pathways</p>
<p>3</p>	<p>This module will enable the students to</p> <ol style="list-style-type: none"> 1. Explain the various metabolic pathways 2. Understand the significance, regulatory mechanisms and synthesis of various essential non nitrogenous compounds synthesized from amino acids. 	<p>Protein Metabolism</p> <ul style="list-style-type: none"> • Trans-amination – with diagrammatic representation,role of pyridoxine,significance • Oxidative and non oxidative De-amination. • Metabolic fate of Ammonia-- Formation of glutamate,Formation of Glutamine • Urea cycle –pathway with structures. • Metabolism of non protein nitrogenous compounds: Structures of purines,pyrimidines and uric acid,catabolic pathways without structures of the intermediates <ul style="list-style-type: none"> • Uric acid and gout. <p>Synthesis (without structures) and significance of glutathione.</p> <p>Synthesis, catabolism and significance of</p>	<p>25 marks</p> <p>Power point presentations/ Assignments/ Displays On various pathways</p>

		<p>Creatnine.</p> <ul style="list-style-type: none"> • Transmethylation and one carbon transfer –scheme of interconversion and disposition of one carbon fragments derived from catabolism of amino acids (without structures) • Metabolic fate of the carbon skeleton of amino acids – glucogenic, ketogenic and glucogenic and ketogenic amino acids. 	
--	--	---	--

References:

1. Rastogi S.C.(2003) ,2nd Edition “Biochemistry”, , Tata MacGraw Hill Publishing Co. Ltd., New Delhi
2. Jain, J, L., S. Jain and N. Jain (2005) “Fundamentals of Biochemistry”. 6th Edition,. S.Chand Company Ltd.
3. Plummer, D.T.,(1971) “An Introduction to Practical Biochemistry”. 2nd Edition, McGraw-Hill Publishing Co. Ltd.
4. Apps D.K. and Cohen B.B. and Steel C.M. (1992), “Biochemistry: A Concise Text for Medical Students” Bailliere Tindall,
5. Debajyoti D, “Biochemistry” 2nd Edition, (1980) Academic Publishers,.
6. Satyanarayana U and Chakrapani U “Biochemistry”, 3rd Edition, (2008), Books & Allied Publishers.
7. Chatterjee M.N., Shinde R. “Textbook of Medical Biochemistry” 8th Edition (2012) Jaypee Brothers, Medical Publishers.
8. Nelson DL & Cox MM. 5th Edition, (2009). “Lehninger’s Principles of Biochemistry”. Freeman and Co.
9. Berg J.M. Tymoczko J.L., and Stryer. L. “Biochemistry”, 5th edition, (2002). W.H. Freeman.
10. Vasudevan D.M. and Sreekumari S – (2007) “Textbook of Biochemistry for Medical Students”. 5th Edition, Jaypee Brothers, Medical Publishers.
11. “Murray Harper’s Illustrated Biochemistry” 29th Edition, (2012) Prentice Hall Int. Voet D, and Voet J.G “Biochemistry” 4th Edition. (2011), *John Wiley*

Biochemistry Practical

Objectives:

The course will enable students to:

- Enable students learn the principles and procedures of biochemical analysis of blood and urine.
- Develop ability to interpret the results of the estimations of the common constituents of biological fluids.

Module No	Objectives	Content	Assessment
1	<p>This module will enable students to:</p> <ol style="list-style-type: none"> 1. Know the principles on which the selected estimations are based. 2. Know the procedures used for the estimations. 3. Draw inferences from the results. 	<ol style="list-style-type: none"> 1. Qualitative Estimation of Normal Constituents of Urine. 2. Qualitative Estimation of Abnormal Constituents of Urine. <p>Quantitative Estimation in Urine.</p> <ol style="list-style-type: none"> 1. Urea 2. Uric acid 3. Glucose <p>Quantitative Estimation in Serum / Blood.</p> <ol style="list-style-type: none"> 1. Urea 2. Uric acid 3. Total protein 4. Albumin, Globulin, A/G Ratio. 5. Glucose 6. Cholesterol 	<p>25 Marks</p> <p>Quiz</p> <p>Journal</p> <p>Practical Tests</p> <p>Interpretation of case studies</p>

References

1. Oser, B. L. Ed (1979),“Hawk's Physiological Chemistry”, 14th.Rep. ed Tata McGraw-Hill Publishing Company Ltd.
2. H. Varley, A. H. Gowenlock, and M. Bell, “Practical Biochemistry, Vol. 1”, London, UK, 5th Edition, (1976), Edited by: I. W. Heinemann.
3. Godkar P.B. Godkar D.P. (2006) Textbook of Medical Laboratory Technology 2nd Edition, Bhalani Publishing House.
4. Burtis C.A, Ashwood E.R, Bruns D.E. (2007), “Tietz Fundamentals of Clinical Chemistry”, 6th Edition, Elsevier Health Sciences.
5. Davidsohn, I (Editor) & Henry, J B (Editor) (1984), “Todd-Sanford Clinical Diagnosis by Laboratory Methods” 17th Edition.W.B. Saunders.