ST.JOSEPH’S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

IV SEMESTER **BIOCHEMISTRY** TIME:4HRS/WEEK

BCH 4803 (3) **INTERMEDIARY METABOLISM, NUTRITIONAL AND CLINICAL BIOCHEMISTRY**

w.e.f. 2020-2021 (20AH) **SYLLABUS** MAX.MARKS:100

**OBJECTIVES: To enable the students to-**

* Sketch the entire carbohydrate metabolism and its energetics
* Comprehend lipid metabolism and its role in human body maintenance
* Explain amino acid metabolism, and Nucleic acid metabolism and interpret its usage in cancer therapy
* Correlate physiological disorders with Nutritional deficiencies
* Evaluate biological fluids for enzymes in diseased states

**COURSE OUTCOMES- Students will be able to**

**CO1:**Identify major pathways of carbohydrate and lipid metabolism

**CO2**:Define major pathways of amino acids and nucleic acid metabolisms

**CO3:**Emphasizethe roleofATPcoupledreactions

**CO4:**Identify and suggest diet for individualssufferingfromproteinenergy malnutrition

**CO5:**Interpret the role of clinically important enzymes in disease states

**UNIT-I: CARBOHYDRATE METABOLISM :** Concept of anabolism and catabolism. Glycolytic pathway, energy yield. Fate of pyruvate-formation of lactate and ethanol, Citric acid cycle, regulation, energy yield, amphipathic role. Anaplerotic reactions. Glycogenolysis and glycogenesis. Pentose phosphate pathway. Gluconeogenesis. Photosytnthesis- Light and Dark reactions, Calvin cycle, C4 Pathway. Disorders of carbohydrate metabolism- Diabetes Mellitus*.*

**UNIT-II: LIPID METABOLISM** : Catabolism of fatty acids (β- oxidation) with even and odd number of carbon atoms,Ketogenesis, *DE NOVO* synthesis of fatty acids, elongation of fatty acids in mitochondria and microsomes, Biosynthesis and degradation of triacylglycerol and lecithin. Biosynthesis of cholesterol. Disorders of lipid metabolism.

**UNIT-III: METABOLISM OF AMINO ACIDS AND NUCLEIC ACID** : General reactions of amino acid metabolism- transamination, decarboxylation and deamination, Urea cycle and regulation, Catabolism of carbon skeleton of amino acids- glycogenic and ketogenic amino acids. Metabolism of aromatic aminoacids (tyrosine, phenylalanine). Inborn errors of aromatic amino acid metabolism.Sources ofthe atoms in the purine and pyrimidine molecules. Biosynthesis and degradation of purines and pyrimidines. Inborn Errors of Nucleotide metabolism

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**UNIT- IV: NUTRITIONAL BIOCHEMISTRY:** Balanced diet. Calorific values of foods and their determination by bomb calorimeter. BMR and factors affecting it. Specific dynamic action of foods. Energy requirements and recommended dietary allowance (RDA) for children, adults, pregnant and lactating women. Sources of complete and incomplete proteins. Biological value of proteins. Malnutrition- Kwashiorkar, Marasmus and PEM. Vitamins- sources, structure, biochemical roles, deficiency disorders of water and fat soluble vitamins. Introduction to neutraceutical and functional foods. Bulk and trace elements-Ca, Mg, Fe, I, Cu, Mo, Zn, Se and F.

**UNIT- V: CLINICAL BIOCHEMISTRY :** Plasma proteins in health and disease. Liver diseases-jaundice. Liver function tests- conjugated and total bilurubin in serum, albumin: globulin ratio, Serum enzymes in liver diseases-SGOT, SGPT, GGT,CPK, Acid and alkaline phosphatases. Serum lipids and lipoproteins. Normal and abnormal constituents of urine. Renal function tests-Blood urea, creatinine, GFR, creatinine clearance. GTT and gastric and pancreatic function tests.

**RECOMMENDED BOOKS:**

1. Essentials of Food and Nutrition, Vol. I & II, M.S. Swaminathan.
2. Text Book of Biochemistry with clinical correlations. Thomas M. Devlin (John Wily).
3. Harper’s Review of Biochemistry, Murray et al (Longman).
4. Biochemical aspects of human disease – R.S. Elkeles and A.S. Tavil. (Blackwell Scientific Publications).
5. Clinical chemistry in diagnosis and treatment–Joan F.Zilva and P.R.Pannall (Lloyd-Luke Medical Books, 1988).
6. Varley’s Practical clinical Biochemistry – Ed. Alan W. Gowenlock (Heinemann Medical Books, London, 1988).
7. Clinical diagnosis and management by Lab methods (John Bernard Henry, W.B. Salunders Company, 1984).
8. Clinical Biochemistry – S.Ramakrishnan and Rajiswami.
9. Chemical Biochemistry (Metabolic and clinical aspects) by W.J.Marshall&S.K.Bangert.
10. Text book of clinical Biochemistry by Tietz et al.

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ST.JOSEPH’S COLLEGE FOR WOMEN ( AUTONOMOUS ) , VISAKHAPATNAM

IV SEMESTER **BIOCHEMISTRY**  TIME:2HRS/WEEK

BCH 4853 (2) **NUTRITIONAL AND CLINICAL BIOCHEMISTRY** MAX.MARKS:50

w.e.f. 2020-2021 (20AH) **PRACTICALS**

**OBJECTIVES: To enable the students to-**

* Learn to identify critical biomolecules and assay them in physiological fluids
* Estimate minerals in serum and fruit juices
* Quantify Hemoglobin the important variable for anemia
* Get acquainted with estimation of variables in urine
* Explore the Immunoassays

**COURSE OUTCOMES- The students will be able to :**

**CO1:** Understand how the biomolecules are utilized in the body

**CO2:**Estimate citric acid content in fruits

**CO3:**Analyze the biological fluids for diseased states

**CO4:** Establish similarities between antigens

**CO5:** Estimate the variables like glucose and cholesterol in blood

**LIST OF EXPERIMENTS:**

1. Estimation of calcium by titrimetry
2. Estimation of iron by Wong**’**s method.
3. Estimation of vitamin C by 2, 6 -dichlorophenol indophenol method.
4. Determination of iodine value of an oil.
5. Estimation of hemoglobin in blood.
6. Visualization of antigen antibody reactions (Ouchterlony technique).
7. Urine analysis for albumin, sugars and ketone bodies.
8. Estimation of urinary creatinine.
9. Estimation of blood Glucose.
10. Estimation of serum total cholesterol.

**RECOMMENDED BOOKS:**

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2. Text Book of Biochemistry with clinical correlations. Thomas M. Devlin (John Wily).
3. Harper’s Review of Biochemistry, Murray et al (Longman).
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