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

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

BCH 4805 (3) **PHYSIOLOGY, NUTRITIONAL AND CLINICAL BIOCHEMISTRY** MAX.MARKS:100

w.e.f. 21AI Batch  **SYLLABUS**

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

* Illustrate Blood coagulation mechanism and learn the basics of digestion of food
* Elucidate transfer of action potential in nerves and muscles
* Explain the role of hormones in human physiology
* Correlate physiological disorders with Nutritional deficiencies
* Evaluate biological fluids for enzymes in diseased states

**Course Outcomes- Students will be able to**

**CO1:**Describethechemicalnatureofenzymes and use appropriate nomenclature

**CO2**:Quantify bioenergetics and elaborate physiological adaptations of plants and animals

**CO3:** Identify major pathways of carbohydrate and lipid metabolism

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

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

**Unit-I: Digestion and Blood 12hours**

Digestion and absorption of carbohydrates, lipids and proteins. Role of enzymes and gastrointestinal hormones in digestion. Composition of blood, Blood groups, coagulation of blood and disorders of blood coagulation (haemophilia). Hemoglobin and transport of gases in blood (oxygen and CO2). Types of anemias, haemoglobinopathies-sickle cell anemia.

**Unit-II: Nervous system and excretory system 12hours**

Introduction to nervous system, general organization of nervous system, Neurons-structure, types, properties and functions; Neurotransmitters, Cerebrospinal fluid-composition and functions, Reflex-types and properties.

Introduction to excretory system. Organization of kidney, Structure and functions of nephron, Urine formation, Role of kidneys in maintaining acid-base and electrolyte balance in the body.

**Unit III: Endocrinology 12 hours**

Endocrinology- organization of endocrine system. Classification of hormones. Outlines of chemistry, physiological role and disorders of hormones of thyroid, parathyroid, pituitary and hypothalamus. Introduction of gastrointestinal hormones. Mechanism of hormonal action- signal transduction pathways for glucocorticoids and insulin. Adrenalin, estrogen and progesterone.

**UNIT- IV: Nutritional Biochemistry 12 hours**

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 12hours**

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

BCP 4855 (2) **Nutritional and Clinical Biochemistry** MAX.MARKS:50

w.e.f. 2021-2022 (21AI) **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).
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