

**SEMESTER – VI**  
**NUTRITIONAL BIOCHEMISTRY**  
**THEORY**

**Programme: B.Sc.**  
**Course Code: U20/BIC/DSE/603**  
**Course Type: DSE - 2**  
**No. of credits: 3**

**Max. Hours: 45**  
**Hours per week: 3**  
**Max. Marks: 100**

**Course Objective:**

Help the students to organize their knowledge on nutrition by explaining the biochemical aspects of it and introduce them to the terminology and types of nutrients.

**Course Outcomes:**

- CO1:** Acquire knowledge of Energy content in food, its utilization and expenditure by the body along with methods of measurement.
- CO2:** Integrate factual Knowledge of various macronutrients in relation with health and disorders.
- CO3:** Classify and contrast the properties, sources, deficiency and toxicity of various micronutrients and minerals.
- CO4:** Learn various assessment procedures for understanding the nutritional status of the body.

**MODULE I: ENERGY METABOLISM****(10 Hrs)**

Unit of energy, Biological oxidation of foodstuff, Measurement of energy content of food. Physiological energy value of foods, SDA. Measurement of energy expenditure- Direct and indirect calorimetry, factors affecting thermogenesis, energy utilization by cells, energy output- Basal and resting metabolism, physical activity, factors affecting energy input- Hunger, appetite, energy balance. Energy expenditure in man. Estimating energy requirements, BMR factors. Recommended dietary allowances for different age groups.

**MODULE II: MACRONUTRIENTS & HEALTH****(15 Hrs)**

Sources and classification of macronutrients in the body. Digestion, absorption, utilization and storage of these with their hormonal regulation. Dietary requirements for homeostasis and health.

Nutritional relevance of carbohydrates- Simple sugar, Complex sugar, Dietary fibers and GI. Essential fatty acids. Function of EFA, RDA- excess and deficiency of EFA. Lipotropic factors, role of saturated fat, cholesterol, lipoproteins and triglycerides. Importance of the following: Omega fatty acids-3 and 6, Mono, polyunsaturated and saturated fatty acids, Dietary implications of fats and oils.

Essential and non-essential amino acids, amino acid availability, antagonism, toxicity, amino acid supplementation, Effects of deficiency, Amino acid pool, NPU, biological Value. Nitrogen balance, Biological Value, RDA for different age groups. PEM – Kwashiorkor, Marasmus.

**MODULE III: MICRONUTRIENTS AND MINERALS****(10 Hrs)**

Micro Nutrients : Vitamins - sources, structure, biochemical role, deficiency disorders of water and fat soluble vitamins, Role of Vitamin A as antioxidant in visual cycle, immunity, vitamin E as antioxidants, role of vitamin C as cofactors in Amino acid modification, extra skeletal role of vitamin D and its effects in bone physiology, Vitamin B6 dietary source, RDA, Hypervitaminosis

Minerals- Fe, Ca, Cr, Mn, Mg, I, Cu, Mo, Zn, Se, F, P distribution in the body, sources, functions, deficiency and toxicity.

**MODULE IV: ASSESMENT OF NUTRITIONAL STATUS & NUTRACEUTICALS****(10 Hrs)**

Anthropometric measurements. Z score, BMI, skinfold, circumference ratio, Biochemical assessment- Urine analysis, Assessment of Anemia, ROS assessment, GTT and glycosylated Hb, Differential diagnosis of B12 and folate.

Nutraceuticals: Nutrient interactions, alcohol Consumption and nutrient deficiency, appetite changes with drug interaction and malnutrition. Food as medicine.

**Reference Books:**

1. Text book of Biochemistry with Clinical Correlations, Devlin, T.M John Willey Sons. Inc.(New York), ISBN;978-0-4710-228173-4.
2. Principles of nutritional Assessment(2005). Rosalind Gibson. Oxford University Press.
3. Nutrition for Health Fitness and Sports(2-013); Williams. MH Anderson, DE Rawson, McGrawhill International Edition. ISBN 978-0-07-131816-7.
4. Krause's food and nutrition care process(2012); Mahan LK Elsevier's Publication ISBN;978-1-43-77-22-33-8.
5. The vitamins, Fundamental aspects in nutrition and health(2008); GF Coombs Jr. Elsevier's Publication ISBN 13-978-0-12-183493-7.

**NUTRITIONAL BIOCHEMISTRY****MODEL QUESTION PAPER****THEORY**

**Course Code: U20/BIC/DSE/603**  
**Credits: 3**

**Max Marks: 60**  
**Time: 2 Hrs**

**SECTION – A****I. Answer the following****4 x 10 = 40 M**

1. Explain the measurement of energy expenditure. Add a note on factors affecting Thermogenesis.

OR

2. What are the factors affecting energy input?

3. Classify the macronutrients. Explain the Dietary requirements for homeostasis.

OR

4. Write about the various types of obesity. Add a note on its etiology and treatment.

5. Explain the physiological role of micronutrients

OR

6. Explain the Role of Vitamin A as antioxidant in visual cycle.

7. What are Nutraceuticals? Explain in detail nutrient interactions.

OR

8. Describe in detail the effects of different types of food processing

**SECTION – B****II. Answer any FOUR****4 x 5 = 20 M**

9. RDA of children  
10. Kwashiorkor  
11. Food additives  
12. Biological Role of Ca  
13. Basal Metabolic Rate  
14. Probiotics