BSc (Hons) Biotechnology-Semester 3
Title of the Course: DSC-3: Subject code: 21BSC3C3BT3L
Paper: Biomolecules

Number of Theory Credits	Number of lecture hrs./semester	Number of practical Credits	Number of practical hrs./ Sem
4	56	**2**	**56**

Unit No.	Course Content	Hours
Unit I	**Carbohydrates** Introduction, sources, classification of carbohydrates. Structure,function and properties of carbohydrates. Monosaccharides – Isomerism and ring structure, Sugar derivatives – amino sugars and ascorbic acid Oligosaccharides – Sucrose and Fructose Polysaccharides – Classification as homo and heteropolysaccharides, Homopolysaccharides - storage polysaccharides (starch and glycogen- structure, reaction, properties), structural polysaccharides (cellulose and chitin-structure,properties),Heteropolysaccharides - glycoproteins and proteoglycans (Brief study). Metabolism:Glycolysis and gluconeogenesis, Kreb's cycle, oxidative phosphorylation. **Amino Acids, Peptides and Proteins** Introduction, classification, and structure of amino acids. Concept of – Zwitterion, isoelectric point, pK values. Essential and nonessential amino acids. Peptide bond and peptide, classification of proteins based on structure and function, Structural organization of proteins [primary, secondary (α,), tertiary and quaternary]. Fibrous and globular proteins, Denaturation, and renaturation of proteins General aspects of amino acid metabolism: Transamination, deamination, decarboxylation, and urea cycle.	14
Unit III	**Vitamins** Water- and fat-soluble vitamins, dietary source and biological role of vitamins Deficiency manifestation of vitamin A, B, C, D, E and K **Nucleic acids** Structures of purines and pyrimidines, nucleosides, nucleotides in DNA Denovo and salvage pathway of purine and pyrimidine synthesis.	14

	Hormones Classification of hormones based on chemical nature and mechanism of action. Chemical structureand functions of the following hormones: Glucagon, Cortisone, Epinephrine, Testosterone and Estradiol.	
Unit IV	**Bioanalytical tools** **Chromatography** Principle, procedure, and applications of - paper chromatography, thin layer chromatography, adsorption chromatography, ion exchange chromatography, gel filtration chromatography, affinity chromatography, gas liquid chromatography and high performanceliquid chromatography. **Electrophoresis:** Principle, procedure, and applications of electrophoresis (paper electrophoresis, gel electrophoresis -PAGE, SDS- PAGE &agarose electrophoresis) and isoelectric focusing. **Spectroscopy** UV-V is spectrophotometry, mass spectroscopy, atomic absorption spectroscopy.	14

Course: Practical-Semester-3
Paper: Biomolecules; Paper Code: 21BSC3C3BT3P

1. Introduction to basic instruments (Principle, standard operating procedure) with demonstration.
2. Definitions and calculations:Molarity, Molality, Normality, Mass percent % (w/w), Percent byvolume (% v/v), parts per million (ppm), parts per billion (ppb), Dilution of concentrated solutions. Standard solutions, stock solution, solution of acids. Reagent bottlelabel reading and precautions.
3. Preparation of standard buffers by Hendersen-Hasselbach equation – Acetate, phosphate,Tris and determination of pH of solution using pH meter.
4. Estimation of maltose by DNS method
5. Determination of α-amylase activity by DNS method
6. Estimation of proteins by Biuret method
7. Estimation of amino acid by Ninhydrin method
8. Extraction of protein from soaked/sprouted green gram by salting out method
9. Separation of plant pigments by circular paper chromatography
10. Separation of amino acids by thin layer chromatography
11. Native PAGE
12. Determination of iodine number of lipids

** Any two experiments given carrying 20 and 15 marks each experiment.

Text Books / References

1. An Introduction to Practical Biochemistry, 3rd Edition, (2001), David Plummer; Tata McGraw Hill Edu.Pvt.Ltd. New Delhi, India
2. Biochemical Methods,1st Edition, (1995), S.Sadashivam, A.Manickam; New Age International Publishers, India
3. Introductory Practical biochemistry, S. K. Sawhney&Randhir Singh (eds) Narosa Publishing. House, New Delhi, ISBN 81-7319-302-9
4. Experimental Biochemistry: A Student Companion, BeeduSasidharRao& Vijay Despande(ed).I.K International Pvt. LTD, NewDelhi. ISBN 81-88237-41-8
5. Standard Methods of Biochemical Analysis, S. K. Thimmaiah (ed), Kalyani Publishers, Ludhiana ISBN 81-7663-067

OPEN-ELECTIVE SYLLABUS
Title of the Course: OEC-3: Subject code: 21BSC3O3BT3
Paper: Nutrition and Health
B.Sc. Semester – III

Courses	Credits	No. of Classes/Week	Total No. of Lectures/Hours	Duration of Exam in hrs	Internal Assessment Marks	Semester End Exam Marks	Total Marks
Theory	03	03	42	2	40	60	100

Unit No.	Course Content	Hours
Unit I	**Introduction** Concepts of nutrition and health. Definition of Food, Diet and nutrition, Food groups. Food pyramids. Functions of food. Balanced diet. Meal planning. Eat right concept. Functional foods, Prebiotics, Probiotics, and antioxidants	14
Unit II	**Nutrients** Macro and Micronutrients - Sources, functions and deficiency.Carbohydrates, Proteins, Fats – Sources and calories. Minerals –Calcium, Iron, Iodine. Vitamins – Fat soluble vitamins –A, D, E & K. Water soluble vitamins – vitamin C Thiamine, Riboflavin, Niacin. Water–Functions and water balance. Fibre –Functions and sources. Recommended Dietary Allowance, Body Mass Index and Basal Metabolic Rate.	14
Unit III	**Bt based pesticides** Methods of cooking affecting nutritional value. Advantages and disadvantages. Boiling, steaming, pressure cooking. Oil/Fat – Shallow frying, deep frying. Baking. Nutrition through lifecycle. Nutritional requirement, dietaryguidelines:Adulthood, Pregnancy, Lactation, Infancy- Complementary feeding, Pre-school, Adolescence, geriatric. Nutrition related metabolic disorders-diabetes and cardiovascular disease.	14

Text Books / References

1. Sri Lakshmi B, (2007), Dietetics. New Age International publishers. New Delhi
2. Sri Lakshmi B, (2002), Nutrition Science. New Age International publishers. New Delhi
3. Swaminathan M. (2002), Advanced text book on food and Nutrition. Volume I. Bappco
4. Gopalan.C., Rama Sastry B.V., and S.C.Balasubramanian (2009), Nutritive value of Indian Foods.NIN.ICMR.Hyderabad.
5. Mudambi S R and Rajagopal M V, (2008), Fundamentals of Foods, Nutrition & diet therapy by New Age International Publishers, New Delhi