



**ADIKAVI NANNAYA UNIVERSITY: RAJMAHENDRAVARAM**

**B.Sc Food Science and Technology**

**Single Major**

**From 2023-24 (Syllabus-Curriculum)**

**Course Structure**

<b>Year</b>	<b>Semester</b>	<b>Course</b>	<b>Title of the Course</b>	<b>No. of Hrs /Week</b>	<b>No. of Credits</b>
<b>I</b>	<b>I</b>	1	Introduction to Food Science and Nutrition	3+2	4
		2	Health, Hygiene & Wellness	3+2	4



**SEMESTER-I**

**COURSE 1: INTRODUCTION TO FOOD SCIENCE AND NUTRITION**

Theory

Credits: 4

5 hrs/week

**Objectives**

- Understanding the role of foods in our daily life
- To gain knowledge of different plant and animal derived foods and their nutritive values and properties
- Understand the vital link between nutrition and health.

**Course Outcome: On completion of the course, the students shall display ability to/ knowledge about**

- Design food products that meet the various food regulations and laws.
- Comprehend the idea of food safety of the product and preserving it in good condition
- Plan adequate meals for different stages of life cycle to maintain health.
- Principles of diet therapy and different therapeutic diets.

**UNIT – I**

- Introduction to nutrition – Definition of nutrition, nutrients, and Food.
- Functions Of Food – Physiological, Social, Psychological and Emotional.
- Food Groups-- Sources and functions of Basic five food groups.

**UNIT- II**

- Classification of Nutrients- Macronutrients and Micronutrients- Sources and functions.
- My Plate, Food Pyramid and portion size- Definition and Illustration
- Inter relationship between Food , nutrition and health.

**UNIT-III**

- Nutrition during Life cycle- Nutritional requirement for all age groups.
- Nutritional requirement during – Pregnancy, Lactation.
- Nutritional requirement during Childhood – Infancy (weaning) and school going.
- Nutritional requirements of youngsters- Adolescents and Adults.
- Geriatric Nutrition- Physiological changes and nutritional requirement.

**UNIT- IV**

- Nutrition During Disease- Classification of Diseases- Communicable and Non-Communicable, mode of transmission.
- Communicable diseases- Types, Diet and lifestyle modifications.
- Non-Communicable diseases- Types, Diet and lifestyle modifications.
- Relation Between Immunity, Health and Nutrition.

**Unit -V**

**Research and standards organization of Food Science and Food Technology-**

- Role and Function of the organizations.
- Nutritional research organization- ICMR-NIN, NNMB.
- Food Technology research organization- AFSTI, CFTRI, DFRL, NIFTEM.
- Food Standards- FSSAI, AMARK, FPO, MMPO.



**References:**

1. Food Facts & Principles by Shakunthala manay & Shadakhraswamy.
2. Food Science by Srilakshmi , second edition,2002
3. Food science, Chemistry and Experimental foods by M. Swaminathan.
4. Food Science by Norman.N.Potter.
5. Experimental study of Foods by Griswold R.M.
6. Food Science by Helen Charley.
7. Vijaya Khader, Text book of food science and technology, Indian council of Agricultural research New Delhi, 2001.
8. Stainley Sacharous. Roger C Griffin. Principles of food packaging 2nd Ed. Avi pub Co. Westport.
9. F.A. & Paine. H.Y. Leonard hill. A hand book of food packaging. Blackie Sons Ltd London.

**Recommended Activities**

- Visits to food industries
- Market survey of preserved fruits and vegetable products.
- Visit to food testing lab or any agency of food standards.



**SEMESTER-I**

**COURSE 2: HEALTH, HYGIENE & WELLNESS**

Theory

Credits: 4

5 hrs/week

**Learning Outcome: On completion of the course a student shall**

- Possess an understanding of the concept of good health and means to achieve it.
- Display the ability to identify the morphology, growth and reproductive features of various microorganisms
- Acquire the skills in various sterilization techniques

**Theory**

**Unit I Health & wellness – Definition & meaning**

- Dimension/ Elements of health and wellness – Physical, Social, Emotional, Intellectual, and Spiritual.
- Factors affecting Health and Wellness
- Indicators of health- concept of Mortality, Morbidity, Disability

**Unit II Classification & Study of Microorganisms-** in terms of morphology, growth, Nutrition and Reproduction

- Bacteria, Virus, Yeasts, Algae and Mould
- Beneficial Applications of Microorganisms in Food Industry, Agriculture and other areas.

**Unit III Mode of infection**

- Infection- sources, mode of transmission.
- Diseases caused by microorganisms-Symptoms, aetiology, mode of transmission of
  - a. Bacterial diseases- Typhoid, Tuberculosis, Jaundice, Dysentery;
  - b. Viral Diseases: Influenza, Measles, Poliomyelitis, AIDS
  - c. Parasite transmitted diseases- Malaria, Dengue, Filariasis.

**Unit IV Prevention & Control**

- Control of Micro-organisms – Sanitation, Sterilization & Disinfection- Physical and chemical method.
- Immunity- definition & types, Immunization schedule
- Hygiene - Meaning and importance of personal hygiene
- Standard precautions to prevent infections

**Unit V Management of Health & Wellness**

- Modern lifestyle and hypo-kinetic diseases; prevention and management through Physical exercise
- Stress, anxiety, and depression- Definition and concept
- Role of Yoga, asanas and meditation in maintaining health and wellness.
- Role of sleep-in maintenance of physical and mental health.

## **Course – I & II Model Paper (70 Marks)**

**SECTION A (Multiple Choice Questions)**

**30 x 1 = 30 M**

**30 Multiple Choice Questions (Each Unit 6 Questions)**

**SECTION B (Fill in the blanks)**

**10 x 1 = 10 M**

**10 Fill in the Blanks (Each Unit 2 Questions)**

**SECTION C (Very short answer questions)**

**10 x 1 = 10 M**

**10 Very short answer questions (Each Unit 2 Questions)**

**SECTION D (Matching) (From 5 Units)**

**2 x 5 = 10 M**

**1 A**

**B**

**C**

**D**

**E**

**2 A**

**B**

**C**

**D**

**E**

**SECTION E (True or False)**

**10 x 1 = 10 M**

**10 True or False (Each Unit 2 Questions)**



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**Single Major B.Sc. Food Science & Technology (w.e.f:2023-24A.B)**

**Programme: B.Sc. Honours in Food Science & Technology (Major)**

**w.e.f. AY 2023-24**

**COURSE STRUCTURE**

<b>Year</b>	<b>Semester</b>	<b>Course</b>	<b>Title of the Course</b>	<b>No. of Hrs /Week</b>	<b>No. of Credits</b>
	II	3	Food Biochemistry	3	3
			Food Biochemistry Practical	2	1
		4	Human Nutrition	3	3
			Human Nutrition Practical	2	1



**SEMESTER-II**

**COURSE 3: FOOD BIOCHEMISTRY**

Theory

Credits: 3

3 hrs/week

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**Learning Objectives**

1. Understand the basic concepts of biomolecules.
2. Explore the concepts of Enzymes and techniques.

**Learning Outcomes**

Upon successful completion of the course, a student will be able to:

LO1: To Study about Classification structure and functions of Carbohydrates.

LO2: To Study about classification structure and function of Proteins

LO3: To Study about classification, structure and functions of lipids

LO4: To Study about Classification and specificity of Enzymes.

LO5: To know about the Fundamental prosperities of water classification of vitamins and minerals

**UNIT –I**

**Carbohydrates:** -Definition structure and isomerism: Classification, properties and uses of monosaccharides, disaccharides, oligosaccharides and polysaccharides and their uses – Reactions of carbohydrates: Hydrolysis, acyclic reactions, dehydration/ thermal degradation, gelatinization caramelization. Hydrophilicity, flavor ligends, Browning, Sweetness. Functions of Polysaccharides: Starch, Cellulose, hemi-cellulose, pentosans, pectin, gums (Alginates, carrageenan, locust bean gum, xanthum gum).Digestion & absorption of carbohydrates.

**Unit – II**

**Proteins:** - Amino Acids: classification, chemical properties. Peptides and Proteins: Primary Structure- Spatial relation- Denaturation. Functional Properties: Hydration, Solubility, Viscosity, Gelatin, Texturization, Emulsification, Foaming. Nutritional Properties. Protein Modification /



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Processing and storage. Millard reactions. Oxidation of amino acids, De-amination. Oxidative and non-oxidative deamination, transamination, deamination, removal of carboxylic group, Carbon skeleton metabolism. Digestion & Absorption of proteins.

**Unit – III**

**Lipids:**-Lipids-definition, classification with examples source and functions of fatty acids, Glycerides- Phospholipids and sterols Physical Aspects: Triacylglycerol Distribution, Positional Distribution, Consistency, Emulsions and emulsifiers-Chemical Aspects: Lipolysis, Auto oxidation, Thermal decomposition, Chemistry of frying. Digestion & Absorption of fats.

**Unit- IV**

**Enzymes:**-Definition, holo enzyme, apoenzyme, zymogene forms classification, specificity, catalysis and regulations- Factors influencing activity: Temperature,  $p^H$ , water activity and ionic strength/ electrolytes-Mechanisms of enzyme inhibition & enzyme activation - endogenous enzymes: pectic enzymes, amylases, catalases and enzymatic browning. cofactors & co enzyme with examples

**Unit – V**

**Basic Principles and techniques-** Fundamental Properties/ Structure: Ice, Water- Availability in foods: Water composition, Isotherms – Effect of Water Activity on Food stability (Shelf life).

Principle & uses of all analytical methods. (Chromatography, Electrophoresis, and Spectrophotometer ).

**REFERENCES**

1. Pomeranz Y and Meloan C E., “Food Analysis: Theory and Practice”, 3<sup>rd</sup> Edition, CBS Publishers, New Delhi, 1996.
2. Nielsen S S., “Introduction to the chemical analysis of foods”, Jones and Bartlett Publishers, London., 1994.
3. Nielsen S S., “Food Analysis Laboratory Manual”, Chips Ltd, USA. 2003.
4. Principles of Biochemistry: Lehninger AL. CBS Publication, New Delhi.
5. Biochemistry: Voet O, Voet G, John Wiley and Sons Publications. 1994
6. Biochemistry: Stryer L. 4<sup>th</sup> Edition, 1994
7. Biochemistry :Zubay G . William C Brown , New York. 1997





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**SEMESTER-II**

**COURSE 3: FOOD BIOCHEMISTRY**

Practical

Credits: 1

2 hrs/week

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1. Estimation of Titrable acidity in foods
2. Estimation of Moisture and total solids analysis
  - a. Karl Fischer titration
3. Estimation of Sugars – Reducing, non reducing, total sugars
4. Estimation of Protein by Kjeldhal Method.
5. Estimation of Fat
  - a. Soxhlet method
  - b. Rosegotlib method
6. Estimation of Ash and Acid insoluble ash
7. Determination of Water activity of different food samples
8. Qualitative tests for amino acids.
9. Qualitative tests for proteins.
10. Estimation of minerals a) calcium) phosphorous (Fiske&subbarow),c)iron(wongs)
11. Estimation of vitamins a) ascorbic acid)
12. Fatty acid model for unsaturation
13. Paper chromatography-amino acid detection.
14. Estimation for maltose-DNase method.



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**SEMESTER-II**

**COURSE 4: HUMAN NUTRITION**

Theory Credits: 3 3 hrs/week

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**Learning Objectives**

To familiarize with the concepts of nutrition

**Learning Outcomes**

Upon successful completion of the course, the students will be able to

LO1: To Understand about Nutrition, and importance of food for Health

LO2: To Analyze about different vitamins and minerals and their importance

LO3: To know about Balanced diet and Recommended Daily Allowances

LO4: To study about diet surveys and Vitamin Deficiency Control Programmes

LO5: To gain knowledge about International agencies like WHO, FAO, UNICEF and CARE

**Unit – I**

Introduction to human nutrition- basic definition of nutrition, health, nutrients. Principles compounds in foods- classification of foods, sources, functions and deficiency symptoms of carbohydrates, proteins, fat, vitamins and minerals.

**Unit – II**

Nutritional requirements for different age groups – infant, pre-school children, school going children, adolescents, adults, old age, pregnancy, lactation and industrial workers; recommended dietary allowances (RDA) for different age groups.

**Unit – III**

Classification of foods, their Nutritive value, effect of processing on nutritive value of foods- obesity, food faddism and faulty food habits- toxicants naturally occurring in foods- food adulteration.



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**Unit – IV**

Food production and consumption pattern in different parts of India – food requirements and availability- applied nutrition programme, diet and nutrition in India.

**Unit – V**

Prevention of malnutrition in developing countries- nutritive value of common Indian recipes- therapeutic diets – food allergy- processed supplementary foods and novel foods.

**References:**

1. Dietetics (2007) by B. Srilakshmi.
2. ICMR (2010). Nutrient Requirements and Recommended Dietary Allowances for Indians
3. Text Book of Human Nutrition (2010) by Bamji
4. Essentials of Human Nutrition (2007) by A.S.Truswell.
5. Nutrition & Dietetics 3rd edition Subhangini Joshi
6. Oxford Handbook of Nutrition and Dietetics (2012) Joan Webster
7. Srilakshmi (2007). Food Science, 4th Edition. New Age International Ltd
8. IFCT (2017) Indian Food Composition Tables



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**SEMESTER-II**

**COURSE 4: HUMAN NUTRITION**

Practical

Credits: 1

2 hrs/week

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1. Identification of food sources for various nutrients using food composition tables.
2. Record diet of self-using 24 hour dietary recall and its nutritional analysis.
3. Introduction to meal planning, concept of food exchange system.
4. Estimation of BMI and other nutritional status parameters.
5. Planning meals for adults of different activity levels for various income groups.
6. Survey of locally available foods and identifying the key nutrients
7. Estimation of BMI and other nutritional status parameters.
8. Formulation of weaning foods
9. Planning and preparation of diets for aged people



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**Single Major**  
**Model Question Paper**  
**SEMESTER-II**  
**BSc. FOOD SCIENCE AND TECHNOLOGY**  
**Paper: 4- FOOD BIOCHEMISTRY**

*Time:3hrs*

*MAX MARKS: 70 M*

**SECTION – A**

**Answer any 5 questions. Each question carries 4 marks (5 X 4 = 20M)**

1. Define Carbohydrates. Classify Carbohydrates.
2. Define Proteins. Classify Amino Acids.
3. Define Lipids. Classify fatty acids
4. Write about endogenous enzymes.
5. Write about Isotherms.
6. Give a note on properties of carbohydrates.
7. Write about Maillard reaction and De- amination.
8. Give the Principles of Spectrophotometer with neat diagram.

**SECTION – B**

**Answer all the questions. Each question carries 10 marks. (5 X 10 = 50M)**

9. Define Polysaccharides. Write about reactions of carbohydrates.

**(OR)**

Define Monosaccharides. Write about digestion and absorption of carbohydrates.

10. Write about structure and nutritional properties of proteins.

**(OR)**

List out the amino acids. Write about digestion and absorption of proteins

11. What are emulsifiers? Write about Chemistry of frying.

**(OR)**

List out the fatty acids and give the functions of fatty acids.

12. Define Apoenzyme. Write about factors influencing enzymatic activity.

**(OR)**

What are cathepsins? Write about enzyme inhibition and inactivation mechanism.

13. Define Water activity. What is the effect of water activity on shelf life of foods?

**(OR)**

Give the principles and uses of Electrophoresis and Chromatography



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**Single Major**  
**Model Question Paper**  
**SEMESTER-II**  
**BSc. FOOD SCIENCE AND TECHNOLOGY**  
**Paper: 4- HUMAN NUTRITION**

*Time:3hrs*

*MAX MARKS: 70 M*

**SECTION – A**

**Answer any 5 questions. Each question carries 4 marks (5 X 4 = 20M)**

1. Define Nutrition. Write about functions of proteins.
2. Write about nutritional requirements of adolescents.
3. Write about faulty food habits.
4. Write about applied nutrition programmes in India
5. Write about nutritive value of any two Indian recipes.
6. Write about food allergies.
7. Write about RDA of old age groups and adults.
8. Write about malnutrition.

**SECTION – B**

**Answer all the questions. Each question carries 10 marks. (5 X 10 = 50M)**

9. Classify foods. Write about deficiency symptoms of Food compounds.

**(OR)**

Write about sources and functions of vitamins and minerals

10. Give nutritional requirements of lactating mothers and industrial workers.

**(OR)**

Write about RDAs for different age groups

11. Write about effect of processing on nutritive value of foods.

**(OR)**

Write a note on Food Adulteration.

12. Write about Food Production and Consumption patterns in India.

**(OR)**

Write about Diet and Nutrition Programmes in India.

14. Write about therapeutic diets and novel food processing.

**(OR)**

Write measures for prevention of malnutrition in developed countries.