



PERIYAR UNIVERSITY

PERIYAR PALKALAI NAGAR

SALEM – 636011

DEGREE OF BACHELOR OF SCIENCE
CHOICE BASED CREDIT SYSTEM

Syllabus for

B.SC. NUTRITION AND DIETETICS

(SEMESTER PATTERN)

**(For Candidates admitted in the Colleges affiliated to
Periyar University from 2017-2018 onwards)**

COURSE OF STUDY AND SCHEME OF EXAMINATION

Part	Paper Code	Subject Title	Hours /Week	Credits	University Examination			Exam Hrs.
					Internal (25%)	External (75%)	Total	
SEMESTER I								
I		Tamil I	6	3	25	75	100	3
II		English I	6	3	25	75	100	3
III		Core I	5	5	25	75	100	3
III		Core Practical I	3	-	-	-	-	
III		Allied I	4	4	25	75	100	3
III		Allied Practical I	3	-	-	-	-	
IV		Value Education	2	2	25	75	100	3
SEMESTER II								
I		Tamil II	6	3	25	75	100	3
II		English II	6	3	25	75	100	3
III		Core II	5	5	25	75	100	3
III		Core Practical I	2	4	40	60	100	3
III		Core Practical II	3	3	40	60	100	3
III		Allied II	4	4	25	75	100	3
III		Allied Practical I	3	2	40	60	100	3
IV		Environmental Studies	1	2	25	75	100	3

Part	Paper Code	Subject Title	Hours /Week	Credits	University Examination			Exam Hrs.
					Internal (25%)	External (75%)	Total	
SEMESTER III								
I		Tamil III	6	3	25	75	100	3
II		English III	6	3	25	75	100	3
III		Core III	5	5	25	75	100	3
III		Core Practical III	2	-	-	-	-	-
III		Allied III	4	3	25	75	100	3
III		Allied Practical II	3	-	-	-	-	-
IV		SBEC I	2	2	25	75	100	3
IV		NMEC I	2	2	25	75	100	3
SEMESTER IV								
I		Tamil IV	6	3	25	75	100	3
II		English IV	6	3	25	75	100	3
III		Core IV	5	5	25	75	100	3
III		Core Practical III	2	3	40	60	100	3
III		Allied IV	4	4	25	75	100	3
III		Allied Practical II	3	2	40	60	100	3
IV		SBEC II	2	2	25	75	100	3
IV		NMEC II	2	2	25	75	100	3

Part	Paper Code	Subject Title	Hours /Week	Credits	University Examination			Exam Hrs.
					Internal (25%)	External (75%)	Total	
SEMESTER V								
I		Core V	5	5	25	75	100	3
II		Core VI	6	5	25	75	100	3
III		Elective course I	6	5	25	75	100	3
III		Core Practical IV	3	-	-	-	-	-
III		Core Practical V	3	-	-	-	-	-
III		Elective II	5	5	25	75	100	3
IV		SBEC III	2	2	25	75	100	3
SEMESTER VI								
III		Core VII	6	5	25	75	100	3
III		Core Practical IV	3	5	40	60	100	3
III		Core Practical V	3	5	40	60	100	3
III		Core Practical III	2	3	40	60	100	3
III		Core VIII	6	5	25	75	100	3
III		Elective Paper III	5	5	25	75	100	3
IV		SBEC IV	2	2	25	75	100	3
IV		SBEC V	2	2	25	75	100	3
IV		SBEC P I	3	2	400	60	100	3
		Extension Activities	-	1	-	-	-	-
		Total		140	1135	2865	4000	

LIST OF CORE PAPERS

- I Human Physiology
- II Food Science
- III Nutritional Biochemistry
- IV Principles of Human Nutrition
- V Nutrition in Life Cycle
- VI Dietetics and Counseling
- VII Food Microbiology
- VIII Advanced Dietetics

LIST OF PRACTICALS

- I Human Physiology
- II Food Science
- III Clinical Nutrition and Food Analysis
- IV Nutrition in Life Cycle and Dietetics
- V Assessment of Food Quality

Students have to choose either SET-I or SET-II for their Elective Courses and Skill Based Elective Courses. Papers from both the sets cannot be mingled. Those students who have selected SET-I for Elective Courses, will have to select SET-I for Skill Based Elective Courses also. Those students, who have selected SET-II for Elective Courses, will have to select SET-II for Skill Based Elective Courses also.

SET-I

LIST OF ELECTIVE COURSES FOR SET-I

- I Quantity Food Service and Physical Facilities
- II Food Product Development and Quality Control
- III Institutional Project

LIST OF SKILL BASED ELECTIVE COURSES (SBEC) FOR SET-I

- I Food Processing
- II Food Packaging
- III Bakery Science
- IV Sanitation and Hygiene in Food Industries
- V Entrepreneurship Development
- VI Food Preservation and Bakery (Practical)

SET-II

LIST OF ELECTIVE COURSES FOR SET- II

- I Nutraceuticals
- II Nutrition for Fitness and Sports
- III Institutional Project

LIST OF SKILL BASED ELECTIVE COURSES (SBEC) FOR SET-II

- I Food Processing
- II Food Chemistry
- III Bakery Science
- IV Food Biotechnology
- V Public Health Nutrition
- VI Food Preservation and Bakery (Practical)

Allied Courses for B.Sc. Nutrition and Dietetics

- I Year - Allied Chemistry
- II Year - Allied Computer Science

Eligibility:

Pass in higher secondary examination conducted by the Board of higher secondary examinations, Tamil Nadu or any other equivalent examination with Nutrition or Dietetics or Home Science or Chemistry or Biology as one of the subjects.

LIST OF NON MAJOR ELECTIVE COURSES (NMEC) OFFERED BY THE BOARD OF NUTRITION AND DIETETICS/ HOME SCIENCE TO OTHER MAJOR STUDENTS

- I Basic Food Science
- II Basic Nutrition

LIST OF ALLIED COURSES OFFERED BY THE BOARD OF NUTRITION AND DIETETICS/ HOME SCIENCE TO STUDENTS STUDYING DEGREE IN LIFE SCIENCES

SET-I

- Food Science-I
- Food Science-II
- Food Analysis Practical

SET-II

- Human Nutrition-I
- Human Nutrition-II
- Clinical Nutrition Practical

NUTRITION & DIETETICS
EVALUATION PATTERN

THEORY

University Examination (UE) 75 Marks	Internal Assessment (IA) 25 Marks
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Question paper pattern for Core and Elective courses

Maximum Marks - 75 Marks

Section A (10 X 2 = 20)

(Answer all questions)

Section B (5 x 5 = 25)

(Internal Choice)

Section C (3 x 10 = 30)

(Answer any 3 out of 5) (*one question from each unit*)

Question paper pattern for Skill Based Elective Courses (SBEC)

Maximum Marks – 75 Marks

Answer any 5 out of the given 8 questions. [5x 15=75 marks]

At least one question from each unit

Question paper pattern for Non Major Elective Courses (NMEC)

Maximum Marks – 75 Marks

Answer any 5 out of the given 8 questions. [5x 15=75 marks]

At least one question from each unit

Classification of Internal Assessment Structure:

		Marks
Test	-	15
Assignment	-	05
Attendance	-	05

		25 Marks

Passing Minimum (IA) - 40 %	-	10 Marks
Passing Minimum (UE) - 40 %	-	30 Marks

Total Passing Minimum	-	40 Marks

PRACTICAL

University Examination (UE) 60 Marks	Internal Assessment (IA) 40 Marks
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Classification of Internal Assessment Structure:

		Marks
Practical	-	25
Record	-	05
Attendance	-	05
		40 marks
Passing Minimum (IA) - 40 %	-	16 Marks
Passing Minimum (UE) - 40 %	-	24 Marks

Total Passing Minimum	-	40 Marks

B.Sc. NUTRITION AND DIETETICS
SEMESTER – I
CORE - I HUMAN PHYSIOLOGY

OUTCOME

The students will be able to

1. Summarize the structure of human systems and integrate their functions with human nutrition
2. Determine the blood parameters
3. Identify the microscopic structure of tissues in various systems

UNIT - I

Cell – Structure of organelles and functions. Tissues – Structure, classification and functions.

UNIT-II

Blood – Composition, functions, coagulation, factors affecting coagulation, blood groups. Gastrointestinal and Hepato biliary system – Structure, physiology and functions for different organs and role of hormones and enzymes.

UNIT-III

Immune system – Innate, acquired and active immunity, cell mediated immunity, humoral immunity and complement system.

Heart and circulation – Structure, cardiac cycle, cardiac output, factors affecting cardiac output, normal ECG, heart failure, blood pressure, control and factors affecting blood pressure.

UNIT-IV

Respiratory system – Structure and functions, Lung volumes and lung capacities, Factors affecting efficacy of respiration.

Excretory system - (A) Urinary System: - Structure and functions of organs of urinary system (In brief), Mechanism of urine formation. (B) Skin:- Structure and functions, Regulation of body temperature.

UNIT-V

Reproductive system –(A)Female reproductive system -- Structure and functions, menstrual cycle, menarche and menopause.

(B) Male Reproductive system -- Structure and functions.

Endocrine system - Thyroid, Parathyroid, Adrenal gland, Pituitary and Sex glands – Structure and functions.

REFERENCES

1. Ross and Wilson: Anatomy and physiology in Health and Illness, 11th Edition, Church Hill Livingstone, 2011
2. West, J.B.: Best and Taylor's Physiological Basis of Medical Practice, 11th Edition, 2007
3. Chatterjee, C.C., Human Physiology: Medical Allied Agency, Calcutta. 1980
4. Gyton: Text Book of Medical Physiology, 9th Edition, Prism Books Pvt. Ltd., W.B. Sanders Company, USA. 1996
5. Keel and Neil: Samson and Wright's Applied Physiology (12th edition), Oxford University Press. London. 2004

**MODEL QUESTION PAPER
HUMAN PHYSIOLOGY**

Time : 3 Hours

Maximum: 75 marks

PART A (10 x 2 = 20 marks)

Answer All Questions

1. What is cell?
2. Write a note on epithelial tissue.
3. Write the functions of blood.
4. What is coagulation?
5. Define active immunity.
6. What is the function of innate immunity?
7. List the functions of the respiratory system?
8. Give the functions of skin.
9. Draw the ovary.
10. List the functions of thyroid gland.

PART B (5 x 5 = 25 marks)

Answer all Questions

11. a) Draw and explain the structure of cell. (or)
b) Write a note on connective tissue.
12. a) Write a note on the composition of blood. (or)
b) What are the different blood groups?
13. a) Discuss the structure of the heart. (or)
b) Write a note on ECG.
14. a) Explain the urine formation. (or)
b) Explain the transport of Carbon dioxide.
15. a) Draw and explain the structure of male reproductive organs. (or)
b) Explain the structure and functions of the Adrenal gland?

PART C (3 x 10 = 30 marks)

Answer any three

16. Explain the structure and function of nervous tissues.
17. Explain the physiology and functions for liver.
18. Explain the cardiac cycle.
19. Explain the factors affecting efficacy of respiration.
20. Explain the menstrual cycle.

B.Sc. NUTRITION AND DIETETICS

SEMESTER –I & II

CORE PRACTICAL – I HUMAN PHYSIOLOGY

Practical hours

I Semester- 3 hours

II Semester- 2 hours

1. Microscopic study of tissues- epithelial, connective and muscular.
2. Collection of blood sample- Capillary blood from finger tips and venous blood.
3. Separation of blood components (Centrifugation).
4. Estimation of hemoglobin- Sahli's Acid hematin method.
5. Determination of Hematocrit (Wintrobe method).
6. Preparation and examination of stained blood smear (Wedge or glass slide method).
7. Determination of Erythrocyte Sedimentation Rate (Wintrobe method).
8. Determination of blood group.
9. Determination of bleeding time (Duke method) and coagulation time (Capillary tube method).
10. Platelet count (Rees Ecker method by hemocytometry).
11. Clinical examination of radial pulse (pulse rate).
12. Measurement of blood pressure (Sphygmomanometry).
13. Effect of exercise on blood pressure and heart rate.
14. Microscopic structure of heart, digestive system and kidney.
15. Microscopic structure of reproductive organs- ovary, uterus, mammary glands and testis.
16. Microscopic structure of endocrine glands- thyroid, pituitary and adrenal.

REFERENCE

1. G.K.Pal and Pravati pal, Text book of practical physiology, Orient Longman Ltd. 2001.

B.Sc. NUTRITION AND DIETETICS

SEMESTER – II

CORE II - FOOD SCIENCE

OUTCOME

The students will be able to

1. Understand the scientific principles underlying food preparation.
2. Develop skill and techniques in food preparation with conservation of nutrients and palatability using desirable cooking methods.

UNIT-I

Food: Definition, functional classification, groups (4,5,7 and 11), food pyramid.

Cooking: Definition and objectives; Methods- Moist heat methods, dry heat methods, combination of both and micro wave cooking; Effect of cooking on nutrients.

Beverages: Classification; Coffee beverage- Constituents and method of preparation; Tea-Types, preparation; Cocoa- Composition, nutritive value and preparation of cocoa beverage; Fruit beverages-Types; Introduction to vegetable juices, milk based beverages, malted beverages, carbonated non alcoholic beverages and alcoholic beverages.

UNIT-II

Cereals and millets: Structure, composition and nutritive value of rice, wheat and oats; Nutritive value of maize, jowar, ragi and bajra. Cereal cookery: Effect of moist heat- Hydrolysis, Gelatinisation and factors affecting gelatinization, gel formation, retrogradation and syneresis; Effect of dry heat; Role of cereals in cookery.

Pulses: Composition, nutritive value, toxic constituents; Pulse cookery- Effect of cooking, factors affecting cooking quality, role of pulses in cookery, germination and its advantages.

UNIT-III

Milk and milk products: Composition and nutritive value of milk; Milk cookery- Effect of heat, effect of acid and effect of enzymes; Milk products- Non fermented and fermented products (does not include preparation); Role of milk in cookery.

Egg: Structure, composition, nutritive value; Egg cookery- Effect of heat, factors affecting coagulation of egg proteins and effect of other ingredients on egg protein; Role of egg in cookery; Home scale method for detecting egg quality.

Meat: Classification, composition, nutritive value, rigor mortis, ageing and tenderizing; Meat cookery- Changes during cooking.

Poultry: Classification, composition and nutritive value.

Fish: Classification, composition, nutritive value, selection and principles of fish cookery.

UNIT-IV

Vegetables: Classification (nutritional), composition, nutritive value; Pigments in vegetables- Water soluble and water insoluble; Enzymes, flavor compounds and bitter compounds; Vegetable cookery- Preliminary preparation, changes during cooking, loss of nutrients during cooking, effect of cooking on pigments, role of vegetables in cookery.

Fruits: Classification, composition, nutritive value, ripening of fruits; Browning- Types and preventive measures.

Spices: General functions, role in cookery; Medicinal value of commonly used spices.

UNIT-V

Fats and oils: Composition and nutritive value, basic knowledge about commonly used fats and oils (lard, butter, margarine, cotton seed oil, ground nut oil, coconut oil, soya bean oil, olive oil, rice bran oil, sesame oil, rape seed oil, mustard oil and palm oil); Spoilage of fat- Types and prevention; Effect of heating, role of fats and oils in cookery.

Sugar and related products: Nutritive value, characteristics and uses of various types of sugars; Sugar cookery- Crystallization and factors affecting crystallization; Stages of sugar cookery; Role of sugar in cookery.

REFERENCES

1. Srilakshmi. B. Food Science, New Age International (P) Ltd. Publishers, Sixth edition.2016.
2. Manay Shakunthala, N and Shadaksharaswamy M. Food Facts and Principles, New Age International (P) Ltd Publishers, Reprint 2005.
3. Swaminathan M., Food Science, Chemistry and Experimental foods, Bappo Publishers company Ltd, 1997.
4. Usha Chandrasekar, Food Science in Indian Cookery, Phoenix publishers House Private Limited, 2002.

MODEL QUESTION PAPER

FOOD SCIENCE

Time : 3 Hours

Maximum: 75 marks

PART A (10 x 2 = 20 marks)

Answer All Questions

1. Define Food Science.
2. List out any four cooking methods.
3. What is meant by body building foods?
4. Mention any four millets frequently used in our diet.
5. What is known as enzymatic browning?
6. Point out any four types of milk.
7. What is meant by Rigor Mortis?
8. Mention any two abuses of spices and condiments.
9. What is smoking point?
10. Write the active principles of tea and coffee.

PART B (5 x 5 = 25 marks)

Answer All Questions

10. a) Classify the food based on nutrients with example. (or)
b) Explain the importance of parboiling in Rice.
12. a) Enumerate the changes during boiling with vinegar and cooking soda in green leafy vegetable cookery. (or)
b) Write short notes on skimmed milk and whole milk.
13. a) Explain briefly about the factors affecting tenderness of meat. (or)
b) How will you select a good egg using house hold method?
14. a) Write short notes on rancidity. (or)
b) Enumerate the uses of spices and condiments in Indian cookery.

15. a) List any four common food items and their adulterants. (or)
b) Write any two procedures to identify the common adulterant in food items.

PART C (3 x 10 = 30 marks)

Answer any Three

16. Describe in detail about “Basic Seven Food Groups” and justify the seven food groups suitability to our Indian condition.
17. Pulses are referred to “Poor man's meat.” Comment on this statement with example.
18. What are the preliminary treatments given to vegetables and root crops prior to cooking?
19. Discuss in detail about the changes in meat during any four methods of cooking.
20. List out any eight spices and condiments usually utilized by Indians and explain the reason for the same.

B.Sc. NUTRITION AND DIETETICS
SEMESTER – II
CORE PRACTICAL II
FOOD SCIENCE

Practical: 3 Hours

1. Grouping of foods according to ICMR classification.
2. Measurement of food materials using standard measuring cups, spoons and weighing.
3. Find the percentage of edible portion of foods.
4. Observe the microscopic structure of different starches before and after gelatinization (rice, wheat and corn).
5. Study the effect of temperature, time of heating, concentration, addition of sugar and acid on gelatinization of starch.
6. Prepare recipes using the following processes- Gelatinization, gluten formation and gel formation.
7. Demonstrate the best method of cooking rice.
8. Demonstrate the effect of soaking, hard water, sodium bi carbonate and papaya on cooking quality of pulses.
9. Prepare recipes using whole gram, dhal, pulse flours, sprouted pulses and cereal pulse combination.
10. Demonstrate the factors affecting coagulation of milk protein.
11. Prepare recipes using milk and its products.
12. Demonstrate the formation of ferrous sulphide in boiling egg and its preventive measures.
13. Demonstrate the effect of addition of acid, fat, salt, water and sugar on the texture of omelettes.
14. Prepare recipes where egg acts as – thickening agent, binding agent, emulsifying agent and enriching agent.
15. Demonstrate the effect of acid, alkali and over cooking on vegetables containing different pigments.
16. Demonstrate the effects of different amounts of water added to vegetables during cooking on flavor and appearance.
17. Demonstrate enzymatic browning in vegetables and fruits and any four methods of preventing it.
18. Prepare the following using fruits and vegetables- salads, soups and curries.
19. Determine the smoking point of any 4 cooking oils.
20. Prepare recipes using shallow fat and deep fat frying methods.
21. Demonstrate the stages of sugar cookery
22. Prepare recipes using various stages of sugar cookery and jaggery.
23. Preparation of any one beverage under the following types- refreshing, nourishing, stimulating, soothing and appetizing.

REFERENCE

1. Srilakshmi. B. Food Science, New Age International (P) Ltd. Publishers, Sixth edition. 2016.

B.Sc. NUTRITION AND DIETETICS

SEMESTER – III

CORE III - NUTRITIONAL BIOCHEMISTRY

OUTCOME

The student will be able to

1. Develop an understanding of the principles of biochemistry.
2. Apply the knowledge acquired to human nutrition

UNIT-I

Fundamentals of Biochemistry, Biological Membranes and Transport. Carbohydrates- Definition, classification. Structure (linear) of Monosaccharides- Glucose, fructose and galactose; Disaccharides- Maltose, lactose and sucrose; Polysaccharides- Starch and glycogen. Definition of Glycolysis, glycogenesis, glycogenolysis and gluconeogenesis. Metabolism- Glycolytic pathway, oxidation of pyruvic acid, Citric Acid Cycle. Pentose Phosphate Pathway

UNIT-II

Lipids- Definition, classification and properties. Metabolism- Beta - Oxidation and biosynthesis of fatty acids. Cholesterol metabolism. Definitions- Ketone bodies, ketogenesis and ketosis.

UNIT-III

Protein- Definition, classification, structure, physical properties, chemical properties and utilization. Amino acids- Types, Definition - deamination, transamination and decarboxylation. Urea production Enzymes and co-enzymes- Definition, types, classification and factors affecting velocity of enzyme catalyzed reactions.

UNIT-IV

Introduction to genetic control of metabolism- Nucleic acids-Types, composition, structure, functions, replication. Elementary knowledge of biosynthesis of protein Electron transport chain and oxidative phosphorylation. Bioenergetics.

UNIT-V

Acid – base balance: Acid-base balance in normal health, definition of buffers, principles of buffers, major sources of acid produced in the body, physiological buffer system and role of different buffer systems. Fluid and electrolyte balance- Maintenance in normal health.

REFERENCES

1. Pattabiraman. T.N. Concise Text Book of Bio-chemistry, 2 nd edition, All India Publishers and Distributors, 1998.
2. Deb. A.C., Fundamental of Biochemistry, New Centruy Book Agency (P) Ltd, Reprint 2004.
3. Ambika Shanmugam, Fundamentals of biochemistry for Medical students, Karthik Pprinters, 7thedition, 1992.
4. U.Sathyanarayana and U.Chakrabani, Biochemistry, Third Edition, Uppala- Author Publishers, 2007.
5. Mahtab. S.Bamji, Kamala Krishnaswamy and G.N.V Brahman, Text Book of Human Nutrition, Oxford and IBH Publishing Company, Third Edition.2009

MODEL QUESTION PAPER
NUTRITIONAL BIOCHEMISTRY

Time: 3 Hours

Maximum:75 marks

PART A (10 x 2 = 20 marks)

Answer all Questions

1. What are the components of carbohydrate?
2. Write any two sources of fat?
3. What is meant by PUFA?
4. Define gluconeogenesis?
5. Define enzymes?
6. Mention any two essential amino acids?
7. What are genes?
8. State the two nitrogen bases of DNA?
9. Define buffer?
10. Give the source of acid produced in the body?

PART B (5 x 5 = 25 marks)

Answer All Questions

11. a) Explain the structure of fructose? (or)
b) How do you classify carbohydrate?
12. a) Brief on properties of lipids (or)
b) Discuss on Ketogenesis
13. a) How is protein digested in human body? (or)
b) Explain deamination and transamination
14. a) Describe Electron Transport Chain (or)
b) Write the functions of DNA?
15. a) Give the principles of buffers (or)
b) Write a note on acid base balance?

PART- C (3×10=30 marks)

Answer any three Questions

16. Enumerate Tri Carboxylic Acid cycle.
17. Give an account on β oxidation of fatty acids.
18. How urea is synthesised in human system?
19. Explain biosynthesis of protein.
20. Elaborate on physiological buffer system.

B.Sc. NUTRITION AND DIETETICS

SEMESTER – III & IV

CORE PRACTICAL III

CLINICAL NUTRITION AND FOOD ANALYSIS

1. Qualitative analysis of sugars and amino acids.
2. Determination of urinary phosphorus and urea.
3. Estimation of blood cholesterol and glucose.
4. Determination of moisture, ash and fiber in food.
5. Estimation of calcium, phosphorous, iron and ascorbic acid in food.
6. Estimation of total nitrogen in food.

B.Sc. NUTRITION AND DIETETICS
SEMESTER – III
SBEC- I (COMMON FOR SET- I & II)
FOOD PROCESSING

OUTCOME

The students will be able to

1. Understand the principles of food processing.
2. Learn about the methods of food preservation.

UNIT-I

Scope and importance of food processing. Cereal – processing of raw and parboiled rice and rice products- Puffing and flaking. Wheat and corn processing, feed for livestock from wheat bran and germ. Potato processing – potato chip, flakes and powder.

UNIT-II

Decortication processing of legumes, effect of processing of legumes on their nutrient composition and quantity and quality, quick cooking legumes, instant legume powders, legume protein concentrates, by-products utilisation of legume processing and storage of legumes.

UNIT III

Processing of oil seeds, packing and storage of fats and oils, change during storage of oils. Oil speciality products-margarine, mayonnaise, salad dressing and fat substitutes, Nutritional food mixes from oilseeds – processing oil seeds for food use, protein enriched foods

UNIT IV

Storage and handling of fresh fruits and vegetables, processing of fruits and vegetables juice concentrates and powders, by- products from fruits and vegetables waste. Canning process of fruits and vegetables. Cultivation of mushroom and its processed products.

UNIT V

Processing of milk, manufacture of butter, paneer and cheese.

Fish processing –canning, freezing, drying, salting, smoking and curing, uses of by-products.

Meat processing - curing and smoking,

Poultry and egg powder – processing and storage.

REFERENCES

1. Norman N. P. and Joseph H.H, Food science, CBS Publishing New Delhi, 1997.
2. Stadelman W.J., Olson V.M, Shemwell G.A and Parch S., Egg and poultry meat processing, Elliwood Ltd, 1998..
3. Subbulakshmi G., Shobha A. Udipi, Food processing and preservation, New age international publisher, New Delhi, 2008.
4. Sivasankar B., Food Processing and Preservation, PHI Learning private limited, New Delhi, 2015.
5. Sumati R. Mudambi,M.V. Rajagopal., Fundamental of food, nutrition and diet therapy. New age international publishers, New Delhi, 2015.

MODEL QUESTION PAPER

FOOD PROCESSING

Time: 3 hrs

Maximum: 75 marks

Answer any five questions

(5x15=75 marks)

1. Explain the processing of raw and parboiled rice and rice products.
2. Describe the decortication processing of legumes.
3. Discuss the potato processing of chip, flakes and powder.
4. Write in detail the nutritional food mixes from oilseeds.
5. Write an essay on cultivation of mushroom and its processed products.
6. Give an account of manufacturing of butter and cheese.
7. Elaborate the fish processing and uses of by-products.
8. Explain the processing of oil seeds, packing and storage of fats and oils.

B.Sc. NUTRITION AND DIETETICS

SEMESTER – IV

CORE IV - PRINCIPLES OF HUMAN NUTRITION

OUTCOME

The students will be able to

1. Gain basic knowledge of the different nutrients and their role in maintaining health of the community.
2. Develop skills in qualitative analysis and quantitative estimation of nutrients.

UNIT-I

Science of Nutrition, Concept of Nutrition- Definition of nutrition, health, nutritional status and malnutrition. RDA- Definition, factors affecting RDA and methods used for deriving RDA.

Carbohydrates- Definition ,composition, functions, maintenance of blood sugar levels, requirement, sources, digestion and absorption; Dietary fiber- Definition, classification, physiological effects and sources.

UNIT-II

Proteins- Definition, composition, nutritional classification of proteins and amino acids, functions, sources, requirements, digestion and absorption. Evaluation of protein quality: PER, BV, NPU and Chemical score.

Lipids- Definition, composition, functions, sources, requirements, digestion and absorption. Essential fatty acids – Definition, functions, sources and effects of deficiency.

UNIT-III

Energy- Definition, units of measurement, direct and indirect calorimetry; Determination of energy value of food, Total Energy requirement, Factors affecting physical activity, Factors affecting Basal Metabolic Rate, factors affecting Thermic effect of food, Recommended Dietary Allowances and Sources

UNIT-IV

Macro Minerals- Calcium and Phosphorous: Functions, requirements, sources and effects of deficiency. Micro minerals- Iron, Iodine, Copper, Fluorine and Zinc: Functions, sources, requirements and effects of deficiency. Sodium and Potassium : Functions, sources, requirements and effects of imbalances.

UNIT-V

Fat soluble Vitamins – Vitamin A, D, E and K: Functions, requirements, sources and effects of deficiency.
Water Soluble Vitamins – Thiamine, riboflavin, niacin, ascorbic acid, folic acid, vitamin B6 and vitamin B12: Functions, requirements, sources and effects of deficiency.

References

1. Sumathi R. Mudambi, Rajagopal, M.V., Fundamentals of Foods and Nutrition, New Age International (P) Ltd, Publishers, Third edition, 1997.
2. Srilakshmi B., Nutrition Science, New Age International (P) Ltd, Publishers, Fifth multi colour edition, 2016.
3. Mangala Kango, Normal Nutrition, Curing diseases through diet, CBS Publications, First edition, 2005.
4. Paul.S., Text Book of Bio-Nutrition, Fundamental and Management, RBSA Publishers, 2003.
5. Sue Rodwell Williams, Nutrition and Diet Therapy, C.V. Melskey Co., 6th edition, 2000.
6. Mahtab. S. Bamji, Kamala Krishnaswamy and G.N.V Brahmam, Text Book of Human Nutrition, Oxford and IBH Publishing Company, Third Edition, 2009.

MODEL QUESTION PAPER
PRINCIPLES OF HUMAN NUTRITION

Time : 3 Hours

Maximum: 75 marks

PART A (10 x 2 = 20 marks)

Answer all Questions

1. What is meant by malnutrition?
2. Mention any two types of enzymes involved in CHO Digestion
3. What is NPU?
4. What are Essential Fatty Acids?
5. Write units of energy
6. State the energy requirement of reference woman and man
7. Give any two micro minerals
8. Mention the deficiency diseases of fluoride
9. Define vitamin
10. Give any two food sources of ascorbic acid

PART B (5 x 5 = 25 marks)

Answer all Questions

11. a) Write the functions of CHO? (or)
b) What are the factors affecting RDA?
12. a) Bring out the nutritional classification of protein? (or)
b) Brief on composition of lipids
13. a) Write a note on thermic effect of food (or)
b) How do you determine energy value by direct calorimetry?
14. a) Write the functions of calcium? (or)
b) Give the effect of sodium and potassium imbalance?
15. a) Brief on vitamin A deficiency disorders? (or)
b) Write a short note on vitamin –B12.

PART C (3 x 10 = 30 marks)

Answer any three

16. Define dietary fiber and Write its physiological effects.
17. How do you determine the quality of protein?
18. What are the factors affecting BMR?
19. Give an account on iron deficiency diseases
20. Explain the role of vitamin- A in vision?

B.Sc. NUTRITION AND DIETETICS

SEMESTER – IV

SBEC- II (FOR SET-I)

FOOD PACKAGING

OUTCOME

The students will be able to

1. Acquire knowledge about various packaging methods and materials used in the market.
2. Apply the knowledge of food packaging on the food products.

UNIT-I

Food packaging- Definition, functions and levels of packaging.

Packaging materials: Introduction, purpose, requirements and characteristics of packaging materials.

Packaging materials for processed foods: Metal cans- Types and their recommended uses. Glass containers- Characteristics, advantages and surface treatments.

UNIT-II

Plastics: General properties, pack requirements, applications, types of packaging plastics- PET, HDPE, PVC, LDPE, PP and PS; plastic films- types and applications; advantages of usage of plastic in food packaging; shrink and stretch films- properties, advantages and disadvantages.

Papers: Types, uses in packaging; corrugated board and solid fiber board- introduction.

Aseptic packaging: Introduction and heating systems involved.

UNIT-III

Modified atmosphere packaging (MAP): Definition, gases used in MAP, types and active packaging.

Microwave or enable packages: Meaning and advantages.

Retortable packages: Types and advantages.

UNIT-IV

Packaging of cereals: Storage of wheat, rice, breakfast cereals and pasta.

Packaging of dairy products: Packaging materials used in dairy industries.

Packaging of fruits and vegetables: Packaging of fresh produce and packaging of minimally processed fruits and vegetables.

Packaging of meat: Packaging of fresh meat, poultry and eggs.

UNIT-V

Application of nanotechnology in food packaging and its benefits. Future of food packaging: Smart packaging and activated packaging; RFID tags in packaging, intelligent packaging, self heating and self chilling packages. Labeling: Definition, purpose, types, materials used, regulations, recent trends, thermo chromic labeling.

REFERENCES

1. NIIR Board of consultants and engineers, Food packaging technology, Hand book, NIIR, Delhi.
2. Neelam Khetarpaul and Darshan Punia, Food Packaging, Daya publishing house, New Delhi. 2012.
3. Vijaya Khader, Text book of food science and technology, Indian council of agricultural research, New Delhi, 2001.

MODEL QUESTION PAPER

FOOD PACKAGING

Time: 3 hrs

Maximum: 75 marks

Answer any five questions

(5x15=75 marks)

1. Discuss the characteristics of packaging materials.
2. Enumerate the use of paper as a packaging material for foods.
3. Highlight the role of MAP in food industries.
4. Explain the packaging materials used in dairy industries.
5. Elaborate the labelling process of food packages.
6. Explain the packaging of fresh fruits and vegetables.
7. Retortable packages- Discuss.
8. Discuss the role of glass containers in food packing.

B.Sc. NUTRITION AND DIETETICS
SEMESTER – IV
SBEC- II (FOR SET-II)
FOOD CHEMISTRY

OUTCOME

The students will be able to

1. Acquire knowledge about the chemistry of nutrients present in the food.
2. Apply the knowledge of food chemistry to nutrition.

UNIT-I

Water and moisture in foods- Hydrogen bonding, bound water, capillary water and loosely bound water; structure and properties of water molecule.

Carbohydrates- Starch: composition, enzymes and starch; pectic substances, protopectins, pectin gels: factors influencing gelling, gums and mucilages; non enzymatic browning reactions.

UNIT-II

Proteins- Native and denatured proteins; gel formation- definition of gel point and theories of gel formation; gelatin; effect of heat treatment on protein. Pure proteins- plant proteins; milk proteins: casein, whey protein and colostrums; egg proteins: egg white proteins, egg yolk.

UNIT-III

Fats and lipids- Physical properties: melting point, softening point, slipping point, shot melting point, specific gravity, refractive index, smoke point, flash point, fire point and turbidity point (definition alone); Chemical properties: Reichert Meissl number, saponification number, Hehner value, iodine number and acetyl value (definition alone); flavor changes- rancidity: types and factors affecting; reversion.

UNIT-IV

Meat and meat products- Animal structure: muscle, connective tissue, collagen, elastin; adipose tissue; tenderness: methods of measurement and factors affecting.

Milk and milk products- Formation of milk, chemical analysis of milk, butter; cheese: composition, unripened and ripened cheese, changes during ripening.

UNIT-V

Fruits and vegetables- Texture; Pigments, polyphenols, flavor compounds in fruits and vegetables; enzymatic browning; post harvest changes in fruits; changes during cooking and processing: pectic substances, cellulose, starch granules, inter cellular air, production of volatile acids and volatile sulfur compounds.

REFERENCES

1. Meyer, L.H., Food Chemistry, CBS publishers and distributors private limited, Chennai, 2004.
2. Chopra, H.K., Panesar, P.S., Food Chemistry, Narosa Publishing House, New Delhi, 2010.
3. Meenakshi Paul, E. I., Experimental Food Chemistry, Gene-Tech Books, New Delhi, 2007.
4. Seema Yadav, Food chemistry, Anmol publication, New Delhi, 1997.

MODEL QUESTION PAPER

FOOD CHEMISTRY

Time: 3 hrs

Maximum: 75 marks

Answer any five questions

(5x15=75 marks)

1. Explain the structure and properties of water molecule.
2. Elaborate gel formation.
3. Highlight the physical properties of fat.
4. Write the methods used for measuring tenderness of meat.
5. Explain the changes that are taking place during cooking of fruits.
6. Give the composition of cheese and explain its ripening process.
7. Enumerate the chemical properties of fat.
8. Explain the non enzymatic browning reaction.

B.Sc. NUTRITION AND DIETETICS

SEMESTER – V

CORE - V

NUTRITION IN LIFE CYCLE

OUTCOME

The students will be able to

1. Understand the physiology of pregnancy and lactation and how these influence the nutritional requirements.
2. Understand the process of growth and development from birth until old age.
3. Get familiar with the nutritional needs at different stages of growth.

UNIT-I

Menu planning – Objectives, planning balanced diets, food exchange lists.

Nutrition in pregnancy – Food and nutrient requirements, physiological changes during pregnancy, developmental stages of the embryo, physiological cost of pregnancy and complications in pregnancy.

Nutrition in lactation – Food and nutrient requirements, physiology of lactation, composition of breast milk, influence of mother's diet on the quality and quantity of milk production.

UNIT-II

Nutrition during infancy – Growth and development during infancy, food and nutrient requirements, advantages of breast feeding, artificial feeding, preterm baby –nutritional requirements, weaning- types of weaning foods and supplementary foods, problems in weaning.

UNIT III

Nutrition during preschool age – Food and nutrient requirements, eating habits and behaviour, growth and development and factors inhibiting growth.

Nutrition for school going children – Food and nutrient requirement, growth pattern, packed lunches, school lunch programmes.

UNIT IV

Nutrition during adolescence – Food and nutrient requirements, changes in growth pattern, puberty, menarche, changes in food habits, binge eating disorder, predisposition to osteoporosis, anaemia, under nutrition, premenstrual syndrome, malnutrition due to early marriage, nutritional programmes.

UNIT V

Nutrition in adulthood – Food and nutrient requirements, changes in consumption pattern - physical, mental and social changes influencing meal pattern.

Nutrition in old age – Food and nutrient requirements, physical, physiological, biological and psychological changes influencing meal pattern.

REFERENCES

1. Wardlaw G.M, Hampi J.S, DiSilvestro R.A, Perspectives in Nutrition, 6th edition, McGraw Hill, 2004.
2. Chadha R and Mathur P, Nutrition: A Lifecycle Approach. Orient Blackswan New Delhi, 2015.
3. Seth V and Singh K, Diet Planning through the Life Cycle: Part 1 Normal Nutrition. A Practical Manual. Elite Publishing House Pvt. Ltd. New Delhi, 2006.
4. Robinson., Normal and therapeutic nutrition.: Macmillan Pub. Company New York , 2006.
5. Sumati R. Mudambi, M.V. Rajagopal., Fundamental of food, nutrition and diet therapy. New age international publishers, New Delhi, 2015.
6. Srilakshmi B., Dietetics, New age international publishers, New Delhi, 2014.

**MODEL QUESTION PAPER
NUTRITION IN LIFE CYCLE**

Time : 3 Hours

Maximum: 75 marks

PART A (10 x 2 = 20 marks)

Answer all Questions

1. What are the principles of planning a meal?
2. Give the composition of breast milk.
3. What is colostrum?
4. What are the points to be considered in introducing weaning foods?
5. List the nutrition related problem in school children.
6. Give the nutritional importance in preschool children.
7. Write a note on malnutrition in adolescence.
8. Give the nutritional importance in adolescence.
9. Give the RDA for an adult man.
10. Suggest any four recipes for an old man.

PART- B (5x5=25 marks)

Answer all the questions

11. a) List the physiological changes which takes place during pregnancy. (or)
b) What are the hormones which control lactation?
12. a) List the advantages of breast milk. (or)
b) What is a supplementary food? Explain some low cost supplementary foods developed in India.
13. a) Mention any four factors to be considered while planning a diet for a preschool child. (or)
b) Plan a packed lunch for a 12 year old boy.
14. a) Describe the changes in food habits for adolescence. (or)
b) Write a note on binge eating disorder
15. a) What alterations would you suggest in the diet plan for an adult man? (or)
b) Describe the changes in consumption pattern for an adult man.

PART- C (3x10= 30 marks)

Answer any THREE questions

16. Discuss Nutritional and food requirements increase during the pregnancy.
17. Describe the growth and development during infancy.
18. Explain in detail nutrition and food requirements of school children.
19. Explain the nutritional programmes for adolescence.
20. Describe the nutritional problems during old age.

B.Sc. NUTRITION AND DIETETICS

SEMESTER – V & VI

CORE PRACTICAL- IV

NUTRITION IN LIFE CYCLE AND DIETETICS

NUTRITION IN LIFE CYCLE

1. Display raw and cooked food materials according to exchange lists given below. Record their nutritive value. Milk exchange list, Meat exchange list, Pulse exchange list, Cereal exchange list, Vegetable-A exchange list, Vegetable-B exchange list, Fruit exchange list and Fat exchange list.
2. Prepare and display one serving of common cooked foods given below. Record their weight and nutritive value. Cereal preparations, pulse preparations, vegetable preparations, fried snacks, non vegetarian preparations, bakery products, chutneys and sweets.
3. Planning, preparing and serving a meal for low income family, middle income family and high income family.
4. Planning, preparing and serving a meal for a pregnant woman in first second and third trimesters.
5. Planning, preparing and serving a meal for a lactating woman (0-6 months and 6-12 months).
6. (a). Planning, preparing and serving a meal for an infant.
(b). Planning and preparing an indigenous weaning mixes.
7. Planning, preparing and serving a meal for a preschooler.
8. Planning, preparing and serving a meal for a school going child (a boy and a girl).
9. (a). Planning, preparing and serving a meal for an adolescent.
(b). Planning and preparation of any five packed lunches.
10. Planning, preparing and serving a meal for an adult (sedentary, moderate and heavy worker).
11. Planning, preparing and serving a meal for an old age person.

DIETETICS

1. Preparation of any 5 recipes for the following therapeutic hospital diets- clear liquid, full liquid, semi solid, bland, soft and regular diets.
2. Planning and preparation of diets for the following conditions using SOAP format for nutritional management. [Students have to analyze the given case history, prepare SOAP note, plan a day's menu and

calculate the nutritional requirements. Record must include Food plan (total exchanges/ day), meal pattern and menu (distribution of exchange into meals and snacks)].

- a. Obesity and under weight
- b. Gastro intestinal disorders – Peptic ulcer, diarrhoea and constipation
- c. Febrile condition- Malaria, typhoid and TB
- d. Diseases of liver and gall bladder-Hepatitis and cirrhosis.
- e. Deficiency disorders- PEM, Iron deficiency anemia and osteoporosis.
- f. Diabetes mellitus
- g. Diseases of cardio vascular system – Atherosclerosis and Hypertension
- h. Diseases of kidney and urinary tract –Nephritis and nephrotic syndrome.
- i. Cancer and AIDS.

REFERENCE

1. V.Vimala, Advances in diet therapy- Practical manual, New Age International Publishers, 2010.

B.Sc. NUTRITION AND DIETETICS

SEMESTER – V

CORE - VI

DIETETICS AND COUNSELING

OUTCOME

The students will be able to

1. Know the principles of diet therapy.
2. Understand the modification of normal diet for therapeutic purpose.
3. Apply the knowledge for planning the therapeutic diet.

UNIT-I

Diet therapy – Concept, purpose and principles of diet therapy, modification of normal diet, types of diets, Special feeding methods – Enteral nutrition, tube feeding, parenteral feeding nutrition and total parenteral feeding nutrition.

Diet in infections and fevers – Typhoid, influenza, tuberculosis, chikungunea, malaria and AIDS –Definition, causes, symptoms, and dietary management.

UNIT-II

Diet in Obesity and underweight – Definition, causes, types and dietary management.

Diet in lung diseases – Asthma, chronic bronchitis and emphysema – Causes, symptoms and dietary management.

Diet in gastrointestinal tract – Constipation, diarrhoea, ulcers and inflammatory bowel diseases – Types, causes, symptoms and dietary management.

UNIT-III

Dietitian – Classification, code of ethics, responsibilities.

Computer application - Use of computers by dietitian, dietary computations, dietetic management, education/ training, information storage and administration.

Teaching aids used by dietitians - charts, leaflets, posters etc., preparation of teaching material for patients suffering from Digestive disorders, Hypertension, Diabetes and Atherosclerosis .

UNIT IV

Nutrition counseling - Definition, expectations, goals, scope and limits.

Practical consideration in giving dietary advice and counseling - Factors affecting and individual food choice, Communication of dietary advice, Consideration of behaviour modification, motivation.

UNIT-V

The Counseling Process - Techniques for obtaining relevant information- Clinical Information, Medical History and General Profile, nutritional assessment, Dietary diagnosis- Assessing food and nutrient intakes, Lifestyles, physical activity, stress.

Implementation - Counseling the client/patient – client concurrence, co-ordination of care plans-the provision of learning experience.

Evaluation - Measuring the success of performance of client and evaluating the counseling process.

REFERENCES

1. Antia F.P. Clinical dietetics and nutrition., Oxford University Press, New Delhi 2008.
2. Mahan, L.K. and Escott-Stump S., Krause's Food Nutrition and Diet Therapy 10th Edition, W.B. Saunders Ltd, 2000.
3. Zeeman, Frances J. Applications of clinical nutrition. Englewood cliffs: Prentice Hall International Inc., 1998.
4. Thomas Briony; (1995). Blackwell Manual of Dietetic practise. (2nd Ed.) Oxford: New York .,1995.
5. Robinson., Normal and therapeutic nutrition.: Macmillan Pub. Company New York , 2006.
6. Sumati R. Mudambi,M.V. Rajagopal., Fundamental of food, nutrition and diet therapy. New age international publishers, New Delhi, 2015.
7. Srilakshmi B., Dietetics, New age international publishers, New Delhi, 2014.

**MODEL QUESTION PAPER
DIETETICS AND COUNSELING**

Time : 3 Hours

Maximum: 75 marks

PART - A (10 x 2 = 20 marks)

Answer all Questions

1. Define diet therapy.
2. What is hospital diet?
3. What is meant by typhoid fever?
4. What is obese condition?
5. What is asthma?
6. Give any four causes for constipation.
7. List the any four ethics of dietitian?
8. What are objectives of diet counseling?
9. Give any four goals of nutrition counseling.
10. Define motivation.

PART- B (5x5=25 marks)

Answer all the questions

11. a) Write a short note on soft-diet. (or)
b) Write a note on tube feeding.
12. a) Give a diet plan for a patient recovering from tuberculosis. (or)
b) Describe the nutritional problems in HIV patients.
13. a) Write a note on lung diseases. (or)
b) How do you prevent constipation?
14. a) Give the role of clinical dietitian in hospital.. (or)
b) Suggest ways of using teaching aids in diet counseling.
15. a) Describe the scope of nutrition counseling. (or)
b) Write a note on evaluation of counseling process.

PART- C (3x10= 30 marks)

Answer any THREE questions

16. What is parenteral feeding? Give a sample of TPN for an adult.
17. Describe the causes, symptoms and dietary management of obesity.
18. Explain peptic ulcer.
19. Explain the use of computers by dietitian.
20. Elaborate in detail about counseling process.

B.Sc. NUTRITION AND DIETETICS
SEMESTER – V
ELECTIVE COURSE I (FOR SET-I)
QUANTITY FOOD SERVICE AND PHYSICAL FACILITIES

OUTCOME

The students will be able to

1. Acquire the knowledge of various facets of functioning of food service institutions.
2. Design and run a quantity food service establishment.

UNIT-I

Quantity food service: Meaning and evolution.

Classification of food service institutions according to

- a. Function: Profit oriented, service oriented and public health facility oriented.
- b. Processing method: Conventional system, commissary system and fast food service systems.
- c. Service of food: Self service, tray service and waiter-waitress service.

UNIT-II

Space organization: Kitchen- Size and type; developing kitchen plan; work simplification- work area, worker's area of reach, work space, equipment materials and supplies and movement at work; features to be considered in designing kitchen; kitchen lay out.

Storage space: Location, planning, lay out, safety and security. Service area: Location, planning, dimensions and decor.

Equipments: Classification, selection, design, installation, operation, care and maintenance of commonly used equipments.

UNIT-III

Food purchasing: Food buyer- Knowledge, quality and functions of a food buyer; methods of buying food.

Receiving and storage of food: Delivery methods, delivery procedure; Receiving; Storage- organization of storages, general procedure for storage; Store keeping- store records, order form and goods received book.

UNIT-IV

Menu planning: Menu- Definition, functions, need for and factors to be considered in menu planning, procedure for writing menu, types and construction of menu, menu display.

Standardization of recipe: Definition, methods of standardization, standard recipe format and uses.

Standard portion sizes: Definition, portioning equipments and portion control.

UNIT-V

Food production: Meaning, types of food production system, process of food production (briefly), large quantity cooking techniques, use of leftover food and holding techniques.

Food service: Meaning, styles- waiter service, self service and vending.

REFERENCES

1. Mohini Sethi and Surjeet Malhan, Catering management- An integrated approach, Third edition, New Age International publishers. 2015.
2. Mohini Sethi, Institutional food management, Second edition, New Age International publishers.2016.
3. Kinton, R and Cesarani, V., The Theory of Catering ELBS, VII Edition, 1992.
4. Lillicap, D.R and Cousins, J.A. Food and Beverage Service, ELBS, IV Edition, 1994.

MODEL QUESTION PAPER
QUANTITY FOOD SERVICE AND PHYSICAL FACILITIES

Time: 3 Hours

Maximum: 75 marks

PART A (10 x 2 = 20 marks)

Answer all Questions

1. What is a commercial catering establishment?
2. What do you mean by transport catering?
3. How will you classify equipments?
4. What is the suitable dimension of a serving area?
5. Define a food buyer.
6. Mention the records to be maintained in store keeping area.
7. What are the two classes of Indian cuisine?
8. Enumerate various methods of standardization.
9. Name the equipments used for holding of food.
10. What is waiter service?

PART B (5 x 5 = 25 marks)

Answer all Questions

11. (a) How hotels are classified? Explain with examples. (or)
(b) Write a note on evolution of quantity food service.
12. (a) Discuss some of the common methods of work simplification. (or)
(b) List the features to be considered in designing a kitchen.
- 13 (a) List the functions of a food buyer. (or)
(b) Mention the procedures to be followed during delivery of goods..
14. (a) What is standard recipe? Highlight its objective. (or)
(b) What are the different types of portion control equipment? Give some examples for standard serving portions of some dishes
15. (a) Briefly explain the use of left over foods. (or)
(b) What are the types of self service?

PART C (3 x 10 = 30 marks)

Answer any three questions

16. How food service establishments are classified? Give examples for each.
17. Discuss the types of storages to be adopted for different food groups.
18. Why is receiving as a function given utmost important and how raw materials are received?
19. Elaborate the types and construction of menu.
20. What is table service? Explain any five types of table service.

B.Sc. NUTRITION AND DIETETICS
SEMESTER – V
ELECTIVE COURSE I (FOR SET-II)
NUTRACEUTICALS

OUTCOME

The students will be able to

1. Illustrate the benefits of using nutraceuticals.
2. Prioritize the inclusion of nutraceuticals in menu planning.

UNIT-I

Nutraceuticals: Definition, other terminologies, categories- nutrients, herbals and dietary supplements; safety and efficacy; regulatory aspects; emerging trends in nutraceuticals in India; challenges faced by nutraceutical industry.

UNIT-II

Action of nutraceuticals: Health benefits of functional ingredients existing in food- dietary fibre, oligosaccharides, sugar alcohols, poly unsaturated fatty acids, peptides and proteins, glycosides, isoprenoides and vitamins, alcohols and phenols, cholines, lactic acid bacteria, minerals and others.

UNIT-III

Biological effects of commonly used functional foods: Dietary fibre, fenugreek seeds, omega -3 fatty acids, functional food for CVD prevention, anticarcinogen turmeric and Coccinia indica.

Prebiotics: Meaning, types, characteristics, medical benefits and safety.

Probiotic foods: Meaning, characteristics, mechanism, spectrum of activity and health claim, dosage.

UNIT-IV

Ligans: Introduction, dietary sources, role as nutraceutical in cancer, fibroids and kidney disease.

Nutraceutical attributes of legumes: Role of starch, protein and micro minerals.

Flax seeds: Introduction, nutrient and nutraceutical content, role in cancer prevention, hypolipemic and hypoglycemic effect.

UNIT-V

Functional dairy foods: Bioactive peptide- definition, sources; probiotic and bioactive peptide based functional foods.

Nutraceutical aspects of fruits and vegetables: Functional components- phytochemicals, phenolic compounds and antioxidants and their health benefits.

Nutraceutical attributes of spices; herbs commonly used as nutraceuticals and anti oxidant rich herbs.

REFERENCES

1. Kamal G.Nath, D. Vijayalakshmi, Nutraceuticals: Challenges and opportunities in 21st century, Agrotech Publishing Academy, Udaipur. 2014.
2. S. Mangaraj, M.K. Tripathi, Nawab Ali, Handbook of Nutraceuticals and functional foods- Soybean as an example, Satish serial publishing house, Delhi. 2013.
3. Handbook of Nutraceuticals and Functional Foods, Second Edition Edited by Robert E.C. Wildman, CRC Press Taylor and Francis Group, 2006.
4. Nutrigenomics and Nutrigenetics in Functional Foods and Personalized Nutrition, Lynnette R. Ferguson, CRC Press Taylor and Francis Group, 2013.

MODEL QUESTION PAPER
NUTRACEUTICALS

Time: 3 Hours

Maximum: 75 marks

PART - A (10 x 2 = 20 marks)

Answer all Questions

1. Define nutraceuticals.
2. Name any two nutrients which are used as nutraceuticals.
3. Give any two health benefits of glycosides.
4. Write any two health benefits of lactic acid bacteria.
5. What are prebiotics?
6. Write any two biological effects of fenugreek seeds.
7. What are the dietary sources of ligands?
8. Give the nutraceutical content of flax seeds.
9. What are bio active peptides?
10. Name any four anti oxidant rich herbs.

PART – B (5 x 5 = 25 marks)

Answer All Questions

11. a. Discuss the regulatory aspects of nutraceuticals. (or)
b. Discuss the emerging trends in nutraceuticals in India.
12. a. List the health benefits of PUFA. (or)
b. List the health benefits of alcohols and phenols.
13. a. Explain the biological effects of omega-3 fatty acids. (or)
b. List the medical benefits of prebiotics.
14. a. Write the nutraceutical attributes of legumes (or)
b. Bring out the role of ligands in cancer and fibroids.
15. Write short notes on (a) phytochemicals (or) (b) phenolic compounds.

PART – C (3 x 10 = 30 marks)

Answer any three questions

16. Discuss the categories of nutraceuticals.
17. Elaborate the nutraceutical function of vitamins and minerals.
18. Describe the characteristics and activity of probiotics.
19. Highlight the nutraceutical effect of flax seeds.
20. Explain the nutraceutical attributes of spices.

B.Sc. NUTRITION AND DIETETICS

SEMESTER – V & VI

CORE PRACTICAL- V

ASSESSMENT OF FOOD QUALITY

1. Estimation of titrable acidity, pectin content of foods and lactose.
2. Estimation of specific gravity of milk using lactometer.
3. Determination of gluten content.
4. Determination of sugar concentration of food products using refractometer.
5. Sensitivity tests for four basic tastes.
6. Isolation of microorganisms by Pure Culture Technique and Microbial count by Standard Plate Count Method.
7. Morphology and structural features of various bacteria and fungi commonly associated with Foods.
8. Tests for identification of adulterants present in commonly used foods.

B.Sc. NUTRITION AND DIETETICS
SEMESTER – V
ELECTIVE COURSE II (FOR SET-I)
FOOD PRODUCT DEVELOPMENT AND QUALITY CONTROL

OUTCOME

The students will be able to

1. Develop new food products.
2. Acquire food quality control techniques.

UNIT-I

New food product- Definition, factors shaping new product development- social concern, health concern, impact of market place influence and technology. Information required prior to launching a new product.

UNIT-II

Food product development tool: Organoleptic testing panels- export profile panels, primary sensory panels and secondary sensory panels; Research guidance panels- purpose, panel organization, utility of results. Interlocking activities of people and organization.

UNIT-III

Types of new products: Completely new product; new product for company existing competitor product-idea sources, “must have”- “would like” specifications; some minor new technology for existing factory; new entry using existing technology in existing factory; steps in the development of new product- concept testing, prototype product, process development, public health clearance, packaged product storage studies, finalize specifications, develop advertising claims, pre production runs, market research, timing.

UNIT-IV

Quality control: Need, role of government and industry in quality control, design of company quality assurance program, objectives of quality assurance activity, raw material quality assurance, in-process quality assurance and finished product quality assurance.

UNIT-V

Regulations in quality control: FAO/WHO Codex Alimentarius commission, PFA, AGMARK, BIS, FPO, CPA, fair average quality (FAQ) specifications for food grains, ISO 9000 series; HACCP- background, principles, benefits and limitations; FSSAI.

REFERENCES

1. Norman W. Desrosier, James N. Desrosier, The Technology of Food Preservation, fourth edition, CBS Publishers and distributors, Delhi.
2. Mark Clute, Food Industry Quality Control Systems, CRC Press, 2008.
3. Inteaz Alli, Food Quality Assurance: Principles and Practices, CRC Press, 2003.

MODEL QUESTION PAPER
FOOD PRODUCT DEVELOPMENT AND QUALITY CONTROL

Time: 3 Hours

Maximum:75marks

PART - A (10 x 2 = 20 marks)

Answer all Questions

1. Write any two objective of quality control.
2. What is meant by quality assurance?
3. Expand the PFA.
4. What is the use of consumer protection act?
5. Give the standards for tea.
6. Give the standards for squash.
7. What is meant by food safety?
8. Give any two examples of chemical hazards.
9. Define adulteration.
10. What are the common adulterants added in cereals?

PART – B (5 x 5 = 25 marks)

Answer All Questions

11. a) Write the functions of quality control. (or)
b) Give the importance of food quality assurance
12. a) Write a short notes on FPO. (or)
b) Discuss the role of HACCP.
13. a) What are factors to be considered while selecting good tea? (or)
b) How will you assess the quality of oils?
14. a) Write a note on food safety. (or)
b) What are the advantages of patent?
15. a) Brief out any two tests to detect the food adulterants. (or)
b) Write a short note on toxic chemicals.

PART – C (3 x 10 = 30 marks)

Answer any three questions

16. Discuss on managing quality in marketing of food products.
17. Discuss the role of AGMARK and BIS.
18. Describe the standards for fruit products.
19. Explain in detail on Food Hazards.
20. Give the common food adulterants in different foods and a test to identify them.

B.Sc. NUTRITION AND DIETETICS
SEMESTER – V
ELECTIVE COURSE II (FOR SET-II)
NUTRITION FOR FITNESS AND SPORTS

OUTCOME

The students will be able to

1. Understand the nutritional needs of athletes.
2. Apply the knowledge acquired for planning diet for athletes.

UNIT-I

Physical fitness: Definition; benefits of physical activity; Physiology and biochemistry of exercise: Muscle contraction; weight and body composition of athletes; adaptation of muscle and body physiology to exercise; effect of excessive physical exercise on cardio vascular and pulmonary system.

UNIT-II

Energy sources for muscle use- ATP, phospho creatine, glucose, fat and protein; anaerobic metabolism for high intensity bursts and power; aerobic metabolism for endurance. Nutritional assessment and counseling for athletes.

UNIT-III

Nutritional requirement: Effect of differential intakes of macro nutrients (carbohydrates, protein and fat) on the athletic endeavor; hydration strategies to optimize physical activity capacity; importance of timing the nutrient and fluid intake to match tissue requirements.

UNIT-IV

Nutritional needs and plans for sports requiring power and speed before, during and after exercise; Nutritional needs and plans for sports requiring endurance before, during and after exercise; Nutrition plan for sports requiring combined power and endurance.

UNIT-V

Nutrition needs of male, female, younger and older athletes. Ergogenic aids: Effect of ergogenic aids and other substances on physical activity; sports drinks for endurance activities; nutrition supplements available for athletes.

REFERENCES

1. Gordan.M.Wardlaw, Perspectives in Nutrition, fourth edition, Mc. Graw Hill companies. 1999.
2. Antia. F.P. and Philip Abraham, Clinical dietetics and Nutrition, fourth edition, Oxford University Press. 2002.
3. Srilakshmi. B., Dietetics, seventh edition, New age international (P) Limited. 2014.
4. L.Kathleen Mahan, Sylvia Escott-stump, Krause's Food, Nutrition and Diet therapy, ninth edition, W.B. Saunders company., 1996.
5. Don Benordot, Advanced sports nutrition, second edition, Human Kinetics, 2012.

MODEL QUESTION PAPER
NUTRITION FOR FITNESS AND SPORTS

Time: 3 Hours

Maximum: 75 marks

PART - A (10 x 2 = 20 marks)

Answer all Questions

1. Define physical fitness.
2. What are actin and myosin?
3. List the sources of energy for athletes.
4. Write the nutritional assessment methods used for athletes.
5. What is the carbohydrate requirement for an athlete?
6. Give the fluid requirement of an athlete per day.
7. Suggest any four foods to a power athlete during an event.
8. Suggest any four foods to a marathon runner after exercise.
9. What are ergogenic aids?
10. Name any four sports drinks available in the market.

PART – B (5 x 5 = 25 marks)

Answer All Questions

11. a. Write the physiology of exercise. (or)
b. Write the effect of excessive physical exercise on cardio vascular system.
12. a. Write a short note on glucose and fat as an energy source for muscles. (or)
b. What is the need for nutritional counseling for athletes?
13. a. Bring out the effect of differential intake of protein on athletic endeavor. or
b. Why the timing of fluid intake is important for athletes?
14. a. Write a nutrition plan for a weight lifter during training. (or)
b. Write a nutrition plan for a weight lifter after the event.
15. a. How the nutritional requirements differ between a male and a female athlete? (or)
b. Write a note on the nutritional supplements available for the athletes.

PART – C (3 x 10 = 30 marks)

Answer any three questions

16. Explain the adaptation of muscle and body physiology to exercise.
17. Elaborate the anaerobic metabolism involved in high intensity bursts and power.
18. Enumerate the hydration strategies to be followed to optimize physical activity.
19. Chart a nutrition plan for sports requiring combined power and endurance.
20. Highlight the effect of ergogenic aids and other substances on physical activity.

B.Sc. NUTRITION AND DIETETICS

SEMESTER – V

SBEC III (COMMON FOR SET-I & II)

BAKERY SCIENCE

OUTCOME

The students will be able to

1. Understand the principles of baking.
2. Acquire basic knowledge on baking techniques.

UNIT-I

Baking: Meaning, process and scientific principles involved. Basic plan and layout of a bakery unit.

Equipments used in bakery: Large equipments, small equipments and tools; types of ovens.

Ingredients used in bakery: Functional classification of ingredients- structure builders, tenderizers, moisteners, driers and flavors.

UNIT-II

Flour: Composition, types and quality characteristics.

Sugar: Sources, uses and types of commercially available sugars.

Fats: Fats used as shortenings- Butter, margarine emulsified fats and flavored oils; properties and uses of shortenings.

UNIT-III

Leavening agents: Definition and classification- physical; chemical-baking powder and its types, baking soda; biological- yeast- types and role in baking.

Moisturizing agents: Egg, water and milk- their role in baking.

UNIT-IV

Bread: Ingredients used, steps in bread making process, processing methods, characteristics of good bread (external and internal), faults in shape, texture, crust and flavor of bread.

Cakes: Ingredients, types, cake making methods, test for doneness, characteristics of good cake (external and internal), cake faults and remedies.

Icing: Meaning, types, ingredients used and preparation guidelines.

UNIT-V

Cookies: Characteristics, preparation methods and problems in cookie making.

Biscuits: Steps involved in biscuit making.

Pastries: Types and method of preparation.

REFERENCES

1. Neelam Khetarpaul, Raj Bala Grewal and Sudesh Jood, Bakery science and cereal technology, Daya publishing house. 2013.
2. John Kingslee, A professional text to Bakery and Confectionary, New Age International (P) Limited. 2014.
3. NIIR Board of consultants and engineers, The complete technology book on bakery products, second edition, National Institute of Industrial Research, Delhi. 2009.
4. Manay Shakunthala, N and Shadaksharaswamy M. Food Facts and Principles, New Age International (P) Ltd Publishers, Reprint 2005.
5. Vijaya Khader, Text book of Food Science and Technology, Indian Council of Agricultural Research, New Delhi, 2001

MODEL QUESTION PAPER

BAKERY SCIENCE

Time: 3 hrs

Maximum: 75 marks

Answer any FIVE questions

(5x15=75)

1. List the essential ingredients in bakery and brief their role.
2. List the type of wheat flours and bring out the characteristics of good quality flour.
3. Elucidate the role of liquids in baking.
4. What are leavening agents? Explain biological leavening agent.
5. Explain types of bread and common defects encountered in bread making.
6. Explain the process of preparation of pastry
7. What are ingredients used in biscuits? Explain their role.
8. What is the meaning for 'icing'? Explain its types.

B.Sc. FOOD AND DIETETICS

SEMESTER – VI

CORE VII

FOOD MICROBIOLOGY

OUTCOME

The students will be able to

1. Understand the role of microorganisms in environment.
2. Apply preservation techniques to avoid food spoilage.

UNIT-I

Microorganisms important in food microbiology – Mold, Fungi, Algae, Bacteria and Virus – general characteristics. Contamination of foods – green plants and fruits, animals, sewage, soil, water, air during handling and processing. Spoilage – cause, classification, factors affecting kinds and numbers of microorganisms in food.

UNIT-II

Spoilage of different groups of foods – cereal and cereal products, vegetables and fruits, meats and meat products, fish and other sea foods, eggs, poultry, milk and milk products and canned foods.

UNIT III

Food preservation – Methods and principles of food preservation, delay of microbial decomposition, prevention of microbial decomposition, removal of micro organisms.

Preservation by use of high temperatures – Factors affecting heat resistance of microorganisms, commercial heat preservation methods –sterilization, canning, pasteurization, blanching.

Preservation by use of low temperatures – Growth of microorganisms at low temperatures, low temperatures storage – cellar, chilling and frozen.

UNIT IV

Preservation by drying - Methods of drying, factors in control of drying, treatments of foods before and after drying. Preservation by chemicals.

Preservation by Irradiation – Microwave radiation, Ultraviolet radiation and ionizing radiation.

UNIT V

Food borne Illness – Food hazards, significance of food borne disease, incidence of food borne illness, risk factors associated with food borne illness.

Bacterial agents of food borne illness – Clostridium botulinum, Escherichia coli, Salmonella, Shigella and Staphylococcus- The organism, pathogenesis and clinical features and association with foods.

REFERENCES

1. Adams M.R., Moss M.O., Food Microbiology, New age international publishers, New Delhi, 2015.
2. William C Frazier., Dennis C Westhoff., Food Microbiology, McGraw Hill education private limited, New delhi, 2014.
3. Sivasankar., Food Processing and Preservation, PHI Learning private limited New delhi, 2015.
4. Branen A.L. and Davidson, P.M.. Antimicrobials in Foods. Marcel Dekker, New Delhi, 1983.
5. Jay J.M., Modern Food Microbiology. 3rd Edn. VNR, New York.utta. 1980 9th Edition, Prism Books Pvt. Ltd.,1986

MODEL QUESTION PAPER
FOOD MICROBIOLOGY

Time: 3 Hours

Maximum: 75 marks

PART - A (10 x 2 = 20 marks)

Answer all Questions

1. Give the importance of bacteria in food microbiology.
2. What are factors that cause spoilage of food?
3. Enumerate the factors that favor food spoilage by microbes
4. How is milk spoiled?
5. Define blanching.
6. What is freezing point?
7. What are the changes produced in foods by radiation?
8. Write a note sodium benzoate.
9. What is food borne illness?
10. What is meant by food hazard?

PART- B (5x5=25 marks)

Answer all the questions

11. a) Give the importance of yeast in food microbiology. (or)
b) Describe the foods contaminated by microbes.
12. a) Describe the spoilage of cereal. (or)
b) Write about the factors that cause spoilage of fruits.
13. a) What are the principle of food preservation? (or)
b) Discuss the different methods of food preservation.
14. a) Discuss the role of chemicals in food preservation.. (or)
b) Write a note on Irradiation .
15. a) Write a note on the significance of food borne disease. (or)
b) What are the risk factors associated with food borne illness?

PART- C (3x10= 30 marks)

Answer any THREE questions

16. Explain the factors affecting kinds and numbers of microorganisms in food.
17. Explain the spoilage of canned foods.
18. Explain the preservation by use of low temperature.
19. Explain the factors in control of drying, treatments of foods before and after drying.
20. Explain the Clostridium botulinum infection.

B.Sc. NUTRITION AND DIETETICS

SEMESTER – VI

CORE VIII

ADVANCED DIETETICS

OUTCOME

The students will be able to

1. Understand the metabolic changes occurring in disease conditions.
2. Apply this knowledge for planning nutritional care of patients.

UNIT-I

Diet in Liver diseases – Function of liver, agent responsible for liver damage, damage caused to liver, symptoms and diet therapy for Jaundice, hepatitis and cirrhosis.

Gallbladder and pancreatic diseases - Causes, symptoms and diet therapy.

Diet and Nutrition in stress, burns and surgery.

UNIT-II

Diet in Diabetes mellitus – Prevalence, types, causes, symptoms, diagnosis, complications and dietary management.

Food allergy – Types of reactions, foods involved in sensitivity, symptoms, diagnosis and treatment.

UNIT III

Diet in Cardiovascular diseases– Hypertension, atherosclerosis, angina pectoris, myocardial infarction and congestive heart failure - Causes, symptoms and dietary management.

Diet in Cancer – The nature and causes of cancer, relationship of food and cancer, treatment and diet.

UNIT IV

Diet in Kidney diseases – Glomerulonephritis, nephrosis, acute renal failure, chronic renal failure and kidney stones - Causes, symptoms and dietary management.

Kidney dialysis – Types and dietary management.

Diet in Gout - Causes, symptoms and dietary management.

UNIT V

Diet in genetic disorders – Phenylketonuria, galactosemia, and fructosuria - Symptoms, diagnosis and dietary management.

Eating disorders- Anorexia nervosa and Bulimia nervosa – Causes, symptoms and diet therapy.

Alcoholism - Effect of alcohol intake, complications and nutrition therapy.

REFERENCES

1. Antia F.P., Clinical dietetics and nutrition., Oxford University Press, New Delhi 2008.
2. Mahan, L.K. and Escott-Stump S., Krause's Food Nutrition and Diet Therapy 10th Edition, W.B. Saunders Ltd, 2000.
3. Zeeman, Frances J. Applications of clinical nutrition. Englewood cliffs: Prentice Hall International Inc., 1998.
4. Thomas Briony; (1995). Blackwell Manual of Dietetic practise. (2nd Ed.) Oxford: New York ., 1995.
5. Robinson., Normal and therapeutic nutrition.: Macmillan Pub. Company New York , 2006.
6. Sumati R. Mudambi, M.V. Rajagopal., Fundamental of food, nutrition and diet therapy. New age international publishers, New Delhi, 2015.
7. Srilakshmi B., Dietetics, New age international publishers, New Delhi, 2014.

**MODEL QUESTION PAPER
ADVANCED DIETETICS**

Time: 3 Hours

Maximum: 75 marks

PART - A (10 x 2 = 20 marks)

Answer all Questions

1. Mention any two functions of liver.
2. What is cholelithiasis?
3. Define atherosclerosis.
4. Expand: BP and CHD.
5. List any two functions of kidney.
6. What is nephritis?
7. Define food allergy.
8. Give any two common cancer problems among man.
9. What is genetic disorder?
10. List the parameters to be considered before surgery.

PART- B (5x5=25 marks)

Answer all the questions

11. a) Write short notes on viral hepatitis. (or)
b) Write the dietary management for a patient suffering with burns.
12. a) Write short notes on Type I Diabetes. (or)
b) Outline various tests for allergic conditions.
13. a) Describe about hypertension in brief. (or)
b) Give the dietary modification of cancer.
14. a) Explain nephritis. (or)
b) Describe about dialysis.
15. a) Elaborate Phenylketonuria. (or)
b) Explain Anorexia nervosa and Bulimia nervosa.

PART- C (3x10= 30 marks)

Answer any THREE questions

16. Explain Jaundice in terms of causes, symptoms and dietary management.
17. Elaborate Type II Diabetes in terms of causes, symptoms and dietary management.
18. Write short notes on angina pectoris and congestive heart failure.
19. Enumerate in detail about kidney stones and its dietary management.
20. What is galactosemia? Write the diet modification to the patients suffering from galactosemia.

B.Sc. NUTRITION AND DIETETICS

SEMESTER – VI

SBEC IV (FOR SET-I)

SANITATION AND HYGIENE IN FOOD INDUSTRIES

OUTCOME

The students will be able to

1. Identify the sources of food contamination.
2. Apply this knowledge for maintaining a sanitary environment in food industries.

UNIT-I

Sanitation: Definition and meaning, deteriorative effects of micro organisms- physical and chemical changes; methods of killing micro organism- heat, chemicals and radiation; methods of inhibiting microbial growth- refrigeration, chemicals, dehydration and fermentation.

UNIT-II

Contamination of food products: Contamination of red meat, poultry and sea food during processing, contamination of dairy products and other food; contamination of ingredients; other sources of contamination- equipment, employees, air and water, sewage, insects and rodents; protection against contamination- protection against environment, protection during storage, protection against contamination from litter and garbage, protection against toxic substances.

UNIT-III

Cleaning compounds: Characteristics of good cleaning compound, classification- alkaline cleaning compound and acid cleaning compound, synthetic detergents, soaps, solvent cleaners; detergent auxiliaries- protection and cleaning auxiliaries; scouring compounds; selection of effective cleaning compound.

Sanitizers: Meaning, Types: thermal sanitizing, radiation sanitizing and chemical sanitizing.

UNIT-IV

Cleaning steps in dairy industry; sanitation practices and procedures in meat processing industry; cleaning steps in sea food plants; cleaning procedure for vegetable and fruit processing industry; cleaning steps of a food service facility.

UNIT-V

Waste disposal: Solid waste disposal; waste water handling- pre treatment, primary treatment, secondary treatment, tertiary treatment and disinfection.

Personal hygiene: Definition, need, personal hygiene and contamination of food products; requirements for hygienic practices; sanitary handling of food.

REFERENCES

1. Norman G. Marriott, Principles of sanitation, Van Nostrand Reinhold company, Newyork. 1985.
2. Mario Stanga, Sanitation: Cleaning and Disinfection in the Food Industry, Wiley, 2010.
3. Y. H. Hui, L. Bernard Bruinsma, J. Richard Gorham, Wai-Kit Nip, Phillip S. Tong, Phil Ventresca, Food plant sanitation, CRC Press, 2002.
4. Y.H. Hui, Plant sanitation for food processing and food service, CRC Press, 2014.

MODEL QUESTION PAPER
SANITATION AND HYGIENE IN FOOD INDUSTRIES

Time : 3 Hours

Maximum :75 marks

Answer Any Five Questions

(5x15=75 marks)

1. Explain the deteriorative effect of micro organisms on food.
2. Explain the contamination of red meat and poultry.
3. Enumerate the types of sanitizers.
4. Explain the cleaning steps to be followed in a vegetable processing industry.
5. Elaborate the importance of personal hygiene in food industries.
6. Write a note on methods of inhibiting microbial growth in food.
7. Give the characteristics and classification of cleaning compounds.
8. Highlight the best waste water treatment methods followed in food industries.

B.Sc. NUTRITION AND DIETETICS

SEMESTER – VI

SBEC IV (FOR SET-II)

FOOD BIOTECHNOLOGY

OUTCOME

The students will be able to

1. Understand the application of biotechnology in food processing.
2. Prepare fermented food products.

UNIT-I

Biotechnology- Meaning and importance, history of biotechnology- traditional and modern biotechnology.

Genetically modified foods- Definition and examples, advantages, disadvantages and safety aspects of foods produced by genetic engineering.

UNIT-II

Food biotechnology- Single cell protein, algae and spirulina: production and uses; Mushroom- production and processing.

Genomics and proteomics- Meaning, types and future; bioinformatics- meaning, sequences and nomenclature; information sources; uses.

UNIT-III

Enzymes- Role in food processing, importance; applications- industrial application of microbial enzymes; production of amylase, lipase and pectinase; immobilized enzymes and their applications.

UNIT-IV

Fermentation- Types, advantages, factors controlling; batch fermentation and continuous fermentation; Fermented products- citric acid, lactic acid, vinegar, wine, beer, oriental fermented foods- tempeh and tofu.

UNIT-V

Biotechnology and biosafety- Introduction to intellectual property rights; intellectual property laws; Trade Related Aspects of Intellectual Property Rights. Forms of IPR like patent, design and copyright

trademark; Bioethics: Necessity of bioethics, different paradigms of bioethics- national and international.

REFERENCES

1. R.C. Dubey, A text book of Biotechnology, S.Chand and company, New Delhi, 2005.
2. S.N. Tripathy, Food biotechnology, Dominant publishers and distributors, 2006.
3. Kumar, H.D., A text book of Biotechnology, Affiliated East-West Press pvt ltd., New Delhi, Second edition, 2004.
4. Kumaresan.V., Biotechnology, Saras Publication, 2005.

MODEL QUESTION PAPER

FOOD BIOTECHNOLOGY

Time : 3 Hours

Maximum :75 marks

Answer Any Five Questions

(5x15=75 marks)

1. Discuss in detail on traditional biotechnology.
2. Give a brief account on the emergence of modern biotechnology.
3. Describe gene therapy and its methods.
4. Explain proteomics and its types.
5. What are the information sources used in bioinformatics?
6. Explain the various applications of enzymes.
7. Describe the production of beer and wine.
8. Write short notes on the following- patents, copyrights and trademarks.

B.Sc. NUTRITION AND DIETETICS
SEMESTER – VI
SBEC V (FOR SET- I)
ENTREPRENEURSHIP DEVELOPMENT

OUTCOME

The students will be able to

1. Understand the requirements to become an entrepreneur.
2. Become an entrepreneur.

UNIT-I

Entrepreneur: Definition, qualities and essential skills of an entrepreneur, communication and presentation skill; innovativeness; idea generation and SWOT analysis. Steps to start a small enterprise, learning journey of a successful entrepreneur.

UNIT-II

Business plan for small enterprises: Importance of business plan, purpose, contents and benefits of business plan; business plan creation process, benefits of business plan, preparation of sample business plan. Business ethics and etiquettes.

UNIT-III

Market survey: Meaning, process of conducting market survey, points to be considered for effective market research; steps to register a company; regulatory requirements.

UNIT-IV

Management process and policies: Importance of policy creation, corporate governance, management process, management functions- production and operation management, marketing management, financial management and human resource management.

Pricing policy and methods of pricing.

UNIT-V

Marketing management- Concept of marketing, market assessment, market regulation, market targeting, marketing mix, promotional strategies and tips for successful marketing.

Financial needs: Types of financial needs- fixed and working capital; methods of raising capital, working capital management, working capital cycle.

REFERENCES

1. Entrepreneurship development- Your gateway to the journey of entrepreneurship, ICT Academy of Tamil Nadu, Chennai. 2015.
2. S.S. Khanka, Entrepreneurial development, S.Chand Publications, 2007.
3. Vasant Desai, Entrepreneurial development, Vol-1, Himalaya Publishing House, 2009.

MODEL QUESTION PAPER
ENTREPRENEURSHIP DEVELOPMENT

Time : 3 Hours

Maximum :75 marks

Answer Any Five Questions

(5x15=75 marks)

1. Explain the qualities and essential skills of an entrepreneur.
2. What are the purpose and content of a business plan?
3. Explain market survey.
4. Enumerate the pricing policy and methods of pricing.
5. Elaborate the methods of raising capital.
6. Give suggestions for promotional strategies.
7. What are the steps to be taken to register a company?
8. Write the steps involved in starting a small enterprise.

B.Sc. NUTRITION AND DIETETICS

SEMESTER – VI

SBEC V (FOR SET- II)

PUBLIC HEALTH NUTRITION

OUTCOME

The students will be able to

1. Understand the role of communication in educating the public about nutrition.
2. Take part in programs targeted to improve the nutritional status of the public.

Unit-I

Definition of public health nutrition and health promotion; public health nutrition cycle; public health approaches- socio ecological approach, life style approach and biological approach.

Assessment of nutritional status in individuals and population: Anthropometry, biomarkers, clinical assessment and dietary assessment- methods and their advantages and disadvantages.

Unit-II

Assessment of physical activity: Physical activity and health; dimensions of physical activity; assessment methods- principle, advantages and disadvantages of objective methods (doubly labeled water method, minute by minute heart rate monitoring, motion sensors and accelerometers) and subjective methods (activity diaries and physical activity questionnaires)

Unit-III

Public health education: Health education- definition, objectives, content and principles. Communication in public health education- key elements and barriers of communication; audio visual aids in communication- (auditory aids, visual aids and combined AV aids); levels of health education- (individual and family health education, group health education and education of general public); planning and evaluation of education program.

Unit-IV

Communicable and non communicable disease- causes, modes of transmission and preventive measures (general only).

Public health aspects of over and under nutrition: BMI criteria by WHO; Obesity as a determinant of mortality and morbidity; under nutrition- definitions, clinical syndromes and public health consequences of under nutrition.

Unit-V

Nutrition related policies and programs: Health, nutrition and family welfare through XIIth five year plan; ICDS- objectives and services; Public Distribution System; Anthyodaya Anna Yojana; National Food Security Act; National Food for Work Program.

National and international agencies in combating malnutrition: International- WHO, FAO, UNICEF- Aim and functions. National- ICAR, ICMR, NIN, NFI, FNB, CFTRI, NNMB, NSI, DFRL- Aim and functions.

References

1. Michael J. Gibney, Barrie M. Margetts, John M. Kearney and Lenore Arab, Public health nutrition, Blackwell publishing company. 2005.
2. Mark Lawrence and Tony Worsley, Public health nutrition from principles to practice, Chennai microprint (P) Ltd., Chennai. 2008.
3. Srilakshmi. B, Nutrition science, fifth edition, New age international (P) limited. 2016.
4. Park.K, Text book of preventive and social medicine, Banarsidas Bhanot publishers, Jabalpur. 1997.

MODEL QUESTION PAPER
PUBLIC HEALTH NUTRITION

Time : 3 Hours

Maximum : 75 marks

Answer Any Five Questions (5x15=75 marks)

1. Explain public health nutrition cycle.
2. Highlight the principles, objectives, advantages and disadvantages of objective methods of assessment of physical activity.
3. Enumerate the use of audio visual aids in communication.
4. Obesity is the determinant of mortality and morbidity- Comment.
5. What are the objectives and services of ICDS?
6. Write the aims and functions of UNICEF in combating malnutrition.
7. Explain the various levels of health education.
8. Explain the clinical assessment method with the advantages and disadvantages.

B.Sc. NUTRITION AND DIETETICS

SEMESTER – VI

SBEC P 1 (Common for SET-I and II)

FOOD PRESERVATION AND BAKERY PRACTICAL

1. Preparation of Jam, Jelly and Marmalade.
2. Preparation of Fruit juices and Squashes.
3. Preparation of Pickles.
4. Preparation of Fruit preserves – Tuity fruity with papaya, petha with white pumpkin and murabha with ginger.
5. Preparation of vathal and vadagam.
6. Preparation bread, bun, cakes, biscuits, cookies, pastry and icing.
7. Preparation of sandwiches and desserts.

B.Sc. NUTRITION AND DIETETICS
SEMESTER - VI
ELECTIVE PAPER- III (Common for SET- I and SET- II)
INSTITUTIONAL PROJECT

It is compulsory for all the students to complete the 2 given institutional training programs in a reputed institution for a period of 15 days each. At the end of the final year, each student has to submit a report of the training and undergo a viva voce examination. Marking system is as follows:

Internal marks for report writing	= 40
External marks	= 60
Total marks	= 100

External marks consist of the following components

20 marks- Performance appraisal report given by training institution

20 marks- Report

20 marks- Viva voce

Internal marks will be awarded by the faculty of the department with whose guidance the report is prepared.

Aspects to be covered in the institutional training programs

(A) Dietary internship training

1. Assessing the nutritional status and diet history of patients.
2. Planning diet sheets, preparing and providing guidance in the production of therapeutic diet.
3. Supervising the preparation of diets.
4. Supervising the delivery of trays to the patient.
5. Getting feedback from patients regarding diets.
6. Understanding the layout of hospital dietary unit.
7. Acquiring practical knowledge in diet counseling.
8. Under taking 2 case studies at hospital situation.

(B) Food processing training

1. Studying the type of processing techniques used by the industry.
2. Gaining knowledge on equipments used in processing.
3. Understanding the packaging process.
4. Obtaining experience in quality control operations.
5. Studying the waste disposal methods.
6. Market survey for the demand for the product in the market.

B.Sc. NUTRITION AND DIETETICS/ HOME SCIENCE

NON MAJOR ELECTIVE COURSES (NMEC)

SEMESTER III

NMEC I - BASIC FOOD SCIENCE

OUTCOME

The students will be able to

1. Know the composition of various foods.
2. Understand the effects of cooking on nutritive value.

UNIT - I

Introduction to Food Science- Functions of food; food guide based on basic five food groups, cooking – objectives and methods.

UNIT – II

Cereals- Composition and nutritive value of rice and wheat. Best method of cooking, loss of nutrients during cooking; Advantages of par boiling.

UNIT - III

Pulses - Composition, nutritive value, best method of cooking, loss of nutrients during cooking, germination and its advantages.

UNIT – IV

Vegetables – Classification, nutritive value, loss of nutrients during cooking and methods of reducing nutrient loss during cooking.

UNIT – V

Fruits- Classification, nutritive value and changes during ripening.

Fleshy foods- Meat, fish, egg and milk: Nutritive value.

REFERENCES

1. Sumathi R. Mudambi, Shalini M. Rao, M.V. Rajagopal Food Science, revised second edition, New Age International (p) Limited, Publishers New Delhi, reprint. 2006.
2. N. Swaminathan, Food Science and Experimental foods, The Bangalore printing and publishing Co. Ltd. Bangalore, 1992.
3. B. Srilakshmi, Food Science, New Age international (P) Ltd, New Delhi, Reprint 2006.
4. N. Shakuntala Manay, M. Shadaksharaswamy, Foods – Facts and Principles. 2nd Edition. New Age International (P) Ltd, New Delhi, Reprint 2005.

MODEL QUESTION PAPER

NMEC 1

BASIC FOOD SCIENCE

Time: 3 Hours

Maximum: 75 marks

Answer any five questions (5x15=75 marks)

1. Explain basic 5 food grouping.
2. Write the nutritive value of rice and wheat.
3. Give the nutritive value of pulses and their loss during cooking.
4. Write the classification and nutritive value of vegetables.
5. What are the changes that occur in fruits during ripening?
6. Write the nutritive value of milk and egg.
7. Explain any 3 methods of cooking
8. Explain the process of germination and its advantages

B.Sc. NUTRITION AND DIETETICS/ HOME SCIENCE

NON MAJOR ELECTIVE COURSES (NMEC)

SEMESTER IV

NMEC II - BASIC NUTRITION

OUTCOME

The students will be able to

1. Understand the principles of nutrition
2. Learn about the nutrients and deficiency

UNIT – I

Carbohydrate – Classification, functions, blood sugar regulation and sources. Importance and sources of fiber.

Energy: Definition, Units for measuring energy, Energy value of foods and RDA.

UNIT – II

Lipids – Composition, classification, functions and sources. Role of lipids in causing heart diseases.

UNIT – III

Protein - Composition, classification (nutritional and biological), functions, sources and RDA.

UNIT – IV

Minerals

Calcium, Phosphorus, Iron, Zinc and Iodine– Functions, sources, requirement and effect of deficiency.

UNIT – V

Vitamins

Vitamin A, D, E, K, B1, B2 & Vitamin C - Functions, sources, requirement and effect of deficiency.

References

1. Mangala Kango Normal Nutrition (Fundamental & Management) RBSA Publishers S.M.S Highway Jaipur – 302003 L, 2003.
2. M. Raheena Begum, Text book of Foods, Nutrition and Dietetics, Second Revised Edition, Sterling Publishers Private Ltd, New Delhi, 2005.
3. B. Srilakshmi, Nutrition Science, New Age International (P) Ltd, New Delhi, 2002.
4. Mahtab S. Bamji, N. Pralhad Rao, Vinodini Reddy, Text Book of Human Nutrition Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi, Reprint 1999.

MODEL QUESTION PAPER

NMEC-2

BASIC NUTRITION

Time: 3 Hours

Maximum: 75 marks

Answer any five questions (5x15=75 marks)

1. Explain the functions and sources of carbohydrates.
2. Explain the classification and functions of lipids.
3. Enumerate the classification and functions of protein.
4. Explain the functions and effects of deficiency of calcium.
5. What are the functions and requirement of vitamin-A.
6. Explain the functions and effects of deficiency of vitamin- C.
7. Bring out the role lipids in heart diseases.
8. Write the sources and requirements of protein.

B.Sc. NUTRITION AND DIETETICS
ALLIED COURSES OFFERED BY THE BOARD OF NUTRITION
AND DIETETICS/ HOME SCIENCE FOR THE STUDENTS STUDYING
DEGREE IN LIFE SCIENCES
SET-I - ALLIED PAPER I
FOOD SCIENCE I

OUTCOME

The students will be able to

1. Understand the principles of food science
2. Learn the composition of various food

UNIT – I

Introduction to Food Science:

Functions of food, food groups, food exchange system, food in relation to health.

UNIT – II

Properties of Foods:

Physical properties: Solution, vapour pressure, boiling point, freezing point osmotic pressure, viscosity, surface and interfacial tensions, specific gravity.

Acids, Bases and Buffers:

Acids and bases in foods, concept of acids and bases, buffers.

UNIT – III

Chemical Bond: Octet rule, ionic bond, covalent bond, polar and non polar molecules, hydrogen bond.

Food Colloids:

Sol	:	Properties, Functions
Gel	:	Properties, Structure.
Emulsion	:	Classification, properties, formulation of emulsion, stability of emulsion, stability of emulsions.
Foam	:	Characteristics, formation of foam, foam stability, factors affecting foam formation.

UNIT- IV

Fats and Other lipids:-

Occurrence in foods and composition, physical and chemical properties of fats and oils, reactions of fats, phospholipids, lipids in foods
Fatty acid – Classification, Functions.

UNIT – V

Carbohydrates:

Monosaccharide:- structure, properties, derivatives, functions of sugars in foods. **Starch:-** Structure, alpha amylase, beta amylase, modified starch. Cellulose and Pectic Substances, Changes of Carbohydrates on cooking, Food sources.

REFERENCES

1. N. Shakuntala Manay, M. Shadaksraswamy, Foods Facts and principles, 2nd edition, New Age international (p)Ltd, 2001.
2. B. Srilakshmi, Food Science 3rd Edition, New Age international (p)Ltd, Reprint 2006.
3. M. Swaminathan, Food Science, Chemistry and Experimental foods, The Bangalore printing and Publishing co Ltd, Reprint 2001.
4. L. Llian Hoagland Meger, Food Chemistry CBS Publishers and Distributes, reprint 2004.
5. Norman. N. Potter, Joseph. H. Hotchkiss, Food Science, CBS Publishers 1996.

B.Sc. NUTRITION AND DIETETICS

ALLIED PAPER II

FOOD SCIENCE II

OUTCOME

The students will be able to

1. Understand the role of food science
2. Develop competence to carryout investigations in food science

UNIT- I

Proteins in foods- Chemical and Physical properties, protein structure, theories of gel formation, gelatin, food protein, nontraditional proteins, Nutritional importance, food sources.

UNIT- II

Water- Water content in foods, role in food preparation.

Composition and nutritive values- Rice, Wheat, Rice bran, wheat germ, wheat bread, Ragi, Maize, Barley, Varugu.

Pulses and Nuts and Oil Seeds- Nutritive value, germination and toxicity, Nutritive values of fleshy foods and milk and milk products.

UNIT- III

Spices and condiments- General functions

Medicinal values – Ajwain, aniseed, asafoetida, chillies, cardamom, clove, coriander seed, cumin seed, fegugneek, garlic, ginger, mint, onion mustard, tumeric and pepper.

Fortification of foods- cereals and cereal products, dairy products, hydrogenated fats, special dietary foods.

UNIT- IV

Enzymes in Food processing- Baking industries carbohydrates, diary industry, fruit products, wine industry.

UNIT- V

Food technology and future foods- Biotechnology in food, biofortification, nutraceuticals, organic foods, low cost nutrient supplement, space food, packaging of food, nutrition labeling.

- Pigments in foods – Chlorophyll, carotenoids, Flavanoids, myoglobin
- Effects of cooking on various nutrients –carbohydrates, fats, proteins, vitamins & minerals
- Food Adulteration & hygiene – Definition, common adultrants in different foods contamination and harmful microorganisms.

REFERENCES

1. N. Shakuntala Manay, M. Shadaksraswamy, Foods Facts and principles, 2nd edition, New Age international (p)Ltd, 2001.
2. B. Srilakshmi, Food Science 3rd Edition, New Age international (p)Ltd, Reprint 2006.
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B.Sc. NUTRITION AND DIETETICS

ALLIED PRACTICAL I

FOOD ANALYSIS PRACTICAL

1. Determination of fiber, moisture and ash content.
2. Estimation of Iron, phosphorus, calcium and vitamin c.
3. Tests for adulterants.
4. Demonstration experiments.
 - i) Iodine value, saponification value and acid number of oil.
 - ii) Estimation of total nitrogen in foods.

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DEGREE IN LIFE SCIENCES
SET-II - ALLIED PAPER – I
HUMAN NUTRITION – I

OUTCOME

The students will be able to

1. Understand the role of macronutrients.
2. Learn the basic metabolism of macronutrients.

UNIT - I

Introduction to Human Nutrition: Orientation to human nutrition, an integrated approach, a conceptual framework for the study of nutrition, relationship between nutrition and health, nutrient: the basics, global malnutrition.

RDA- meaning, RDA of nutrients for different age groups.

UNIT – II

Energy Metabolism: Introduction: Introduction, measurement of food energy, energy intake and expenditure, measurement of energy expenditure, energy requirements, maintenance of body weight, excess energy intake, food sources of energy.

UNIT – III

Proteins and Aminoacids: Introduction composition, classification, functions, food sources of protein, digestion, absorption, essential aminoacid, protein deficiency.

UNIT -IV

Carbohydrates: Introduction, composition, classification, functions, food sources, digestion, absorption, utilisation, regulation of blood sugar, Dietary fiber: Classification, sources, role in health and diseases.

UNIT -V

Fats and other Lipids: Introduction, composition, sources, classification, functions, digestion, absorption, essential fatty acids, Diet and heart ailments: effect of diet on plasma lipids, plasma cholesterol, plasma triglycerides.

References:

1. Sumati R. Mudambi, M.V. Raja gopal – Fundamentals of Foods and Nutrition 4th edition, New Age International (P) Limited, Publishers, 2001.
2. Mangala Kargo – Normal nutrition Fundamentals and management, RBSA Publishers, 2003.
3. Michael J. Gibney, Hester H. Vorster and Frans J. Kok – Introduction to Human nutrition, Blackwell publishing 2003.
4. B. Srilakshmi Nutrition Science, New Age International (P) Limited, Publishers, 2002.

B.Sc. NUTRITION AND DIETETICS

ALLIED PAPER – II

HUMAN NUTRITION – II

OUTCOME

The students will be able to

1. Understand the role of micronutrients.
2. Develop competence to carry out investigations in nutrition.

UNIT – I

Fat Soluble Vitamins: Vitamin A, D, E, K – Functions, food sources, recommended daily allowances, effect of deficiency.

UNIT – II

Water Soluble Vitamins: Vitamin B Complex – Thiamine, Riboflavin, Niacin, Pyridoxine, Folic acid, Vitamin B₁₂ and Vitamin C: Functions, food sources, recommended daily allowances, effect of deficiency.

UNIT – III

Minerals: Introduction, nature and composition, general functions of minerals, Absorption of minerals. Calcium, Phosphorus, Iron, Iodine, Zinc, Fluoride: Functions, food sources, requirements, effect of deficiency.

UNIT – IV

Water and Electrolytes: **Water** - Body composition, functions, water balance, food sources, requirement, problems of dehydration and oedema. **Electrolytes:** Sodium, Potassium – Functions, food sources, requirements utilisation, effects of deficiency and excess.

UNIT – V

Food guides for selecting an adequate diet: Introduction development of a food guides basic five groups, Food exchange lists, use of the food guide in meal planning and evaluation. Fortification, enrichments, functional foods, phytochemicals.

References

1. Sumati R. Mudambi, M.V. Raja gopal – Fundamentals of Foods and Nutrition 4th edition, New Age International (P) Limited, Publishers, 2001.
2. Mangala Kargo – Normal nutrition Fundamentals and management, RBSA Publishers, 2003.
3. Michael J. Gibney, Hester H. Vorster and Frans J. Kok – Introduction to Human nutrition, Blackwell publishing 2003.
4. B. Srilakshmi Nutrition Science, New Age International (P) Limited, Publishers, 2002.

B.Sc. NUTRITION AND DIETETICS

ALLIED PRACTICAL I

CLINICAL NUTRITION PRACTICAL

1. Determination of urinary phosphorus, calcium, urea, ascorbic acid and creatinine.
2. Estimation of cholesterol, Iron, hemoglobin, glucose and phospholipids.