**THIRUVALLUVAR UNIVERSITY**

**MASTER OF SCIENCE DEGREE COURSE**

**M.Sc. FOODS AND NUTRITION**

**CBCS Pattern**

 **(With effect from 2020-2021)**

**Programme Specific Outcomes**

* + Enable to pursue highereducation and Researchin academic and research institutions.
	+ Inculcate comprehensive and analytical skills in food industries and health sectors.
	+ Take up professions in community upliftment programmes.
	+ Excel in community health nutrition for employment in State and Central Government.
	+ Understand the current concept of personalized nutrition with reference to nutrigenetics and nutrigenomics.

**The Course of Study and the Scheme of Examination**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Sl.******No.*** | ***Study Components*** | ***ins. hrs / week*** | ***Credit*** | ***Title of the Paper*** | ***Maximum Marks*** |
| ***Course Title*** | ***CIA*** | ***Uni. Exam*** | ***Total*** |
| **SEMESTER I** |  |
| 1 | Core-Theory | Paper-1 | 6 | 5 | Advanced Physiology | 25 | 75 | 100 |
| 2 | Core-Theory | Paper-2 | 6 | 5 | Advanced Food Science | 25 | 75 | 100 |
| 3 | Core-Theory | Paper-3 | 5 | 5 | Essentials of Macronutrients | 25 | 75 | 100 |
| 4 | Core-Practical | Paper-1 | 3 | 0 | Advanced Food Science | 0 | 0 | 0 |
| 5 | Core-Practical | Paper-2 | 3 | 0 | Essentials of Macronutrients | 0 | 0 | 0 |
| **Internal Elective for same major students (Choose any one)** |
| 6 | **CoreElective** | **Paper-1** | 4 | 3 | **(to choose 1 out of 3)**A. Health and FitnessB. Food Hygiene and SanitationC. Food Processing | 25 | 75 | 100 |
| **External Elective for other major students (Inter/multi disciplinary papers)** |
| 7 | **Open Elective** | **Paper-1** | 3 | 3 | **(to choose 1 out of 3)**A. Culinary SkillsB. Basic Food ScienceC. Nutraceuticals | 25 | 75 | 100 |
|  |  |  | **30** | **21** |  | **125** | **375** | **500** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SEMESTER II** |  | ***CIA*** | ***Uni. Exam*** | ***Total*** |
| 8 | Core-Theory | Paper-4 | 5 | 4 | Essentials of Micronutrients | 25 | 75 | 100 |
| 9 | Core-Theory | Paper-5 | 4 | 4 | Nutrition Through Life Cycle | 25 | 75 | 100 |
| 10 | Core-Theory | Paper-6 | 4 | 4 | Food Microbiology | 25 | 75 | 100 |
| 11 | Core-Practical | Paper-1 | 4 | 4 | Advanced Food Science & Essentials of Macronutrients | 25 | 75 | 100 |
| 12 | Core-Practical | Paper-2 | 4 | 4 | Essentials of Micronutrients & Nutrition Through Life Cycle | 25 | 75 | 100 |
| Internal Elective for same major students (Choose any one) |
| 13 | **CoreElective** | **Paper-2** | 4 | 3 | **(to choose 1 out of 3)**A. Food Standard and Quality ControlB. Hospital Food ServiceC. Textiles and Clothing in Human Care | 25 | 75 | 100 |
| External Elective for other major students (Inter/multi disciplinary papers) |
| 14 | **Open Elective** | **Paper-2** | 3 | 3 | **(to choose 1 out of 3)**A. Bakery ScienceB. Home Scale Preservation of fruits and VegetablesC. Lifestyle Practice | 25 | 75 | 100 |
| 15 | **\*Field Study** |  | - | 2 |  | 100 | - | 100 |
| 16 | **Compulsory Paper** | 2 | 2 | **Human Rights**  | 25 | 75 | 100 |
|  |  |  | **30** | **30** |  | **300** | **600** | **900** |

**\* Field Study**

There will be field study which is compulsory in the first semester of all PG courses with 2 credits. This field study should be related to the subject concerned with social impact. Field and Topic should be registered by the students in the first semester of their study along with the name of a mentor before the end of the month of August. The report with problem identification and proposed solution should be written in not less than 25 pages in a standard format and it should be submitted at the end of second semester. The period for undergoing the field study is 30 hours beyond the instructional hours of the respective programme. Students shall consult their mentors within campus and experts outside the campus for selecting the field and topic of the field study. The following members may be nominated for confirming the topic and evaluating the field study report.

(i). Head of the respective department

(ii). Mentor

(iii). One faculty from other department

**THIRUVALLUVAR UNIVERSITY**

**M.Sc. FOODS AND NUTRITION**

**SYLLABUS**

**UNDER CBCS**

**(with effect from 2020-2021)**

**SEMESTER I**

**CORE PAPER 1**

**ADVANCED PHYSIOLOGY**

**OBJECTIVES**

To enable the Students to:

* Gain knowledge on body fluids and circulatory system
* Understand the significance of blood and immunity
* Comprehend the general structure and functions of organs in the body.
* To gain knowledge on various systems of the body.
* To comprehend the mechanism involved in secretion and muscular involvements of the body.

**UNIT-I**

Physiological aspects of body fluid- Body fluid compartment, composition of body fluid, importance of body fluid and lymph and lymphatic system - Homeostasis.

Physiological aspects of muscle tissue - structure, chemical composition, mechanism and energetics of muscle contraction, muscle fatigue.

Physiological aspects of nerve tissue - structure, composition & functions of nerve tissue and anatomy of nerve system.

**UNIT-II**

Blood Circulation and Renal system

Blood - composition, functions of basic elements of blood and plasma proteins, blood volume, origin and conduction of heart beat and heart rate, ECG-interpretation, Latest development in cardiac condition, cardio vascular system and mechanism and homeostasis.

Excretion - formation of urine, micturition, characteristics of urine, normal and abnormal constituents of urine, acid - base balance by kidney

**UNIT-III**

Respiratory and Digestive system

Physiological anatomy of respiratory tract, mechanics of respiration, transport of respiratory gases in blood exchange of respiratory gases, pulmonary volumes, regulation of respiration.

Physiological anatomy and functions of Gastrointestinal Tract, movement of gastro intestinal tract, Mechanism of secretion of gastric juice, hormones involved in digestive system.

Hunger, Appetite, Satiety - physiological and psychological factors affecting food intake, circadian rhythm in GI tract secretions.

**UNIT-IV**

Endocrine and Reproductive system

Physiological anatomy of endocrine glands and Reproductive organs. Hormones - Mode of action, functions of hormones of the endocrine glands - Pituitary, Adrenal, Thyroid, Gonadal hormones, Pancreas, Pineal body and Parathyroid, Hypo and Hyperfunctions of the glands.

**UNIT-V**

Nervous system – Structure and functions of brain, spinal cord and neuron; conduction of neuro impulse, role of neuro transmitters; blood brain barriers, role of cerebrospinal fluid and hypothalamus in body functions.

Immunity - Properties, natural and acquired Immunity, features of immune responses, antigen - antibodies - types, properties, antigen - antibody interaction, Auto immune disorders.

 **Course Outcomes:**

* Understand the basic tenets of human physiology
* Acquire skills in measurement of blood pressure, ECG, grouping of blood
* Comprehend the role of digestive juices and hormones andthe structure and functions of nerves
* Enumerate the process of gaseous exchange and urine formation andfunctions and secretion of hormones
* Apply knowledge gained in physiology to nutrition and health

**REFERENCES:**

1. Guyton, A.G. and Hall, J.B. (2005): Text Book of Medical Physiology, 9th Edition, W.B. Sanders Company, Prism Books (Pvt.) Ltd., Bangalore.
2. Wilson, K.J.W and Waugh, A. (2003): Ross and Wilson Anatomy and Physiology in Health and Illness 8th Edition, Churchill Livingstone.
3. Jain, A.K.: Textbook of Physiology. Vol.I and II. Avichal Publishing Co., New Delhi.
4. McArdle, W.D., Katch, F.I. and Katch V.L(2001): Exercise Physiology. Energy, Nutrition and Human Performance, 4th Edition, Williams and Wilkins, Baltimore.

**CORE PAPER 2**

**ADVANCED FOOD SCIENCE**

**OBJECTIVES**

To enable the Students to

* Acquire knowledge about the basic concepts of food science
* Understand the principles and physiological changes in foods with the effect of cooking.
* Gain insight into the composition and nutritive value of various foods.
* Describe the role of non nutritive components of food in health
* Study the effects of acid, alkaline and heat on the cooking of foods on the composition.

**UNIT-I**

**Cereals and Cereal products**

Cereals - Rice & wheat and other Millets - Composition and Nutritive Value.

Starch - Sources, Characteristics, Dextrinisation, Gelatinisation, Retrogradation and principles of Starch cookery.

Batter and Dough - Structure, Principle, Properties, Different types of flour, Gluten -

 properties, Gluten formation.

Flour - Types, properties. Bread - yeast leavened, Quick bread, pastries. - Role of ingredients & preparation of cake, bread and biscuits.

**UNIT-II**

**Pulses, Vegetables and Fruits**

Pulses - Composition, types, nutritive value, toxic constituents and its removal, Germination, factors affecting Germination, Cooking methods and factors affecting cooking quality.

Vegetables - Structure, Classification, Composition, Nutritive value, Methods of Cooking, Changes in vegetables and pigments on Cooking.

Fruits - Structure, Classification, Composition, Ripening of fruits, changes on ripening, Pectic substances, Cooking changes, browning reactions in fruits and vegetables.

**UNIT-III**

Egg - Structure, Composition, Nutritive value, Grading, Methods of preservation and Cooking and Role of egg in Indian cookery.

Meat - Structure, Composition, Nutritive value, Classes and Grades of meat cuts, tenderization, Rigor mortis. Poultry - Composition, Nutritive value, Grades, Methods of cooking and Changes on cooking.

Fish - Composition, Nutritive value, Types, Cuts, Selection, Spoilage, Cooking and Factors effecting cooking quality.

**UNIT-IV**

Milk and Milk Products - Composition, Nutritive value, Constituents, Properties of milk, Effects of acid, Salt, Heat on milk proteins and coagulation. Milk products - Ice cream, Types, Crystal formation and Dairy forms.

Fats & Oils – Types, properties of fat relating to cooking, Rancidity- types and tests for rancidity, Hydrogenation, Changes taking place in fat during heating, Factors affecting fat absorption, Shortening, Use of fats in Indian cookery.

**UNIT-V**

Sugar cookery - Types of sugar, Properties, Crystallization, Stages in Sugar cookery, Application in Indian recipes.

Beverages - Classification, Nutritive value, Preparation of milk based and fermented beverages.

 Spices and Condiments – Types and Use of spices and condiments in Indian cookery.

**Course Outcomes:**

* Gain knowledge on physio chemical changes in food and factors affecting the quality and quantity of nutrients
* Learn the structure and properties of food components
* Enlighten with techniques of food science to be applied in formulation and development of new food products ,normal and therapeutic foods
* Knowledge about food additives and limitations and application of food additives in food industry
* Able to discuss the changes that takes place in fats and oils on heating and preventive measure to overcome the undesirable changes that takes place in fats like rancidity and decomposition of triglycerides

**REFERENCES**

1. Potter, N. and Hotchkiss, J.H. (1996): Food Science, Fifth edition, CBS Publishers and Distributors, New Delhi.
2. Belitz, H.D. and Grosch, W. (1999): Food Chemistry, (2nd edition), Springer, New York.
3. SriLakshmi, B. Food Science, New Age International [p] Limited, New Delhi, Third Edition, 2003
4. Shakuntalamanay, N& Shadaksharaswamy, M, Foods, facts and principles, Wiley Eastern Ltd. 2004.
5. Christian, E.W. Essentials of Food Science, XXIV edition, WWW.Springer.com/978-1-4614-9137-8. 2014.

**CORE PAPER 3**

**ESSENTIALS OF MACRO NUTRIENTS**

**OBJECTIVES**

To enable the students to

* Gain knowledge on classification, functions, metabolism, requirements and sources of macronutrients.
* Develop skills to evaluate protein quality.
* Understand the role of macronutrients in health and diseases.

**UNIT-I : CARBOHYDRATES**

Classification, functions, digestion, absorption, metabolism, utilization and storage, hormonal regulation of blood glucose, role of carbohydrate in dental caries, sources and requirements.

Dietary fibre - Development and concept, types and role of fibre in lipid metabolism, colon function, blood glucose level and GI tract functions – Advantages and Disadvantages of Dietary fibre.

**UNIT-II : LIPIDS**

Classification, sources, functions, digestion, absorption, utilization and storage, effects of deficiency and excess of fat, lipotropic factors, role of saturated fat, cholesterol, lipoprotein and triglycerides and EFA in health, sources and requirements.

**UNIT-III : PROTEINS AND AMINOACIDS**

Classification, functions, digestion, absorption, utilization and storage, protein quality evaluation, nutritional classification of aminoacids, aminoacid balance, imbalance and toxicity, aminoacid pool, sources and requirements.

**UNIT-IV : ENERGY**

Energy value of foods, SDA, energy production, factors affecting thermogenesis, energy utilization by cells, energy output - BMR, physical activity, factors affecting energy input - hunger, appetite, energy balance, measurement of energy content of food, BMR and Total energy expenditure.

**UNIT-V : INTER RELATION BETWEEN MACRONUTRIENTS**

Inter relationship between carbohydrate, fat and protein, nutritional adaptation and in malnutrition.

Homeostasis- Definition, Concepts and mechanism.

Electrolytes - Electrolyte content of fluid compartments, Functions of electrolyte, Sodium, Potassium and Chloride, Absorption, Transport and Electrolyte Imbalance, Factors affecting electrolyte balance ,Maintaining electrolytes, hydrogen ion balance, distribution of water, functions of water and Water balance.

**Course Outcomes:**

* Understand the role of energy in various physiologicalconditions of the body.
* Know the nutritional significance and health benefits of macronutrients.
* Explore the role of glucose, dietary fibre, aminoacids and fatty acids in human nutrition and disease.
* Acquire skills to evaluate protein quality
* Comprehend on the water balance and assessment of hydration status.

**REFERENCES:**

1. Shills, M.E., Olson, J., Shike, M. and Roos, C (2003). Modern Nutrition in Health and Disease, 9” edition Williams and Williams. A Beverly Co. London.
2. Bodwell, C.E.. and Erdman, J.W. (2008) Nutrient Interactions. Marcel Dekker Inc. New York
3. Sareen, S, James, J (2005). Advanced Nutrition in Human Metabolism, 4th Edition, Thomson Wordsworth Publication, USA.
4. Chandra, R.K. (eds) (2002): Nutrition and Immunology, ARTS Biomedical. St. John’s Newfoundland.

**Journals:**

1. Indian Journal of Nutrition and Dietetics
2. American Journal of Clinical Nutrition
3. British Journal of Nutrition
4. European Journal of Clinical Nutrition
5. International Journal of Vitamin and Nutrition Research
6. International Journal of Food Science and Nutrition 8. Nutrition Research

**CORE ELECTIVE**

**PAPER-1**

**(To choose 1 out of 3)**

1. **Health and fitness**

**OBJECTIVES:**

To enable the students to acquire

1. Elementary knowledge on wellness and fitness
2. .Knowledge on relationship between nutrition and wellness
3. Insight into the relationship between physical activity, wellness and fitness

**UNIT-I** : **Wellness, Fitness and Health**

Definition and Indicators of Health - Parameters, Components and Relationship between Wellness, Fitness and Health - Challenges and Personalized Approach.

**UNIT-II: Nutrition and Health**

Introduction - Food Groups, Adequate Diet, My Pyramid, Gandhian Foods For Health, Millennium Development Goals, Role of Macro and Micro nutrients - Carbohydrates, Proteins, Fats, Vitamin D, Calcium, Iron, Optimum Nutrition and Hydration for Health.

**UNIT III: Physical Activity Training**

Aerobic and anaerobic training -To enhance Cardio Vascular Endurance, Flexibility and Body Composition, Measurement of PAL, Benefits of Fitness training and Gadgets for measuring PA.

**UNIT - IV**: **Diseases due to Faulty Food Habits and Physical Inactivity**

Non communicable Disease conditions- Underweight, Obesity, Diabetes Mellitus, Hypertension, Cancer, Cardiovascular Disease, Anaemia.

**UNIT-V: Stress and Health Management**

Stress Assessment and Management Techniques-Under Weight, Overweight and Obesity, Relaxation Techniques –Yoga and Meditation for Health

**Course Outcome:**

1. Understand Concept of Fitness Training
2. Foster Fitness Skills
3. Prevent and Manage Lifestyle related Disorders
4. Utilise exercise in Stress and Health Management
5. Gain the Technical Ability to run Fitness Centres

**Text Books**

1. Werner W. K Hoejer, „Life time Physical Fitness and Wellness‟, Morton Publishing

 Company Colorado, 1989

1. Swaminathan T, „Essential of Food and Nutrition‟, Bangalore Printing Publishing Company, 2008.

**Reference Books**

1. William D. Mc Ardle, Frank I. Katch, Victor L. Katch „Exercise Nutrition: Energy Nutrition and Human Performance” William & Wilkin Publishing, USA, 1996.
2. Kathleen Mahan, Sylvia Escott Stump, “Krause‟s Food and Nutrition and Diet Therapy‟ W.B Saunders Company, USA, 2000.

**CORE ELECTIVE**

**PAPER-2**

**B. FOOD HYGIENE AND SANITATION**

**Objectives:**

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.

**Course Outcomes:**

1. Understand the national and international programmes and laws on food safety and Standards
2. Recognize the role of food handlers, food safety officers and health personnel
3. Master the standards followed for food safety
4. Appreciate the importance of personnel and environmental hygiene

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.

**CORE ELECTIVE**

**PAPER-3**

**C. FOOD PROCESSING**

**Objectives**

Study of this paper will enable the students

1. To impart systematic knowledge of basic and applied aspects in food Processing and technology.
2. To optimise process parameter for consistent quality processed

**UNIT-I**

Basic principle of food processing, Need for food processing, Basic unit operations In food processing- cleaning separating, heat exchanging , evaporation, drying, Forming, packaging and controlling. Processing techniques: Using high Temperatures, low temperatures, ionizing radiation, microwave and ohmic Processing of foods. Effect of various processing techniques on nutritive value of Foods. Manufacturing of sugar and its types.

**UNIT-II**

Cereal technology: Rice- Milling, parboiling: Methods, advantages and Disadvantages, byproducts of rice milling and their utilization. Wheat: Milling Process, byproducts of wheat milling. Millets: Milling of major and minor millets. Malting and fermentation. Manufacturing of break fast cereals: Extruded products, Puffing, flaking.

**UNIT-III**

Pulse technology: Milling of soya bean and Bengal gram and their byproducts, Germination, fermentation, parching, popping, processed soya products. Nuts and Oil seeds: Milling, techniques in extraction of oil, byproducts- Meal concentrates, Isolate. Speciality fats, hydrogenation, production of MCT. Fat replacers and their Uses.

**UNIT-IV**

Dairy technology: Milk processing: Seperation, standardization, pasteurization, Homogenization, sterilization, evaporation, drying, membrane fractionation. Manufacturing of cheese, butter, khoa, yoghurt,srikhand, ice cream, condensed Milk and dry milk. Milk substitutes- Lactone, infant formula. Byproducts: Skimmed milk, lassi, butter milk, whey, ghee residue.

**UNIT-V**

Fruits and vegetable technology: Dehydration, juice concentrate, canning of fruits And vegetables. Potato processing and its products (wafers and French fries). Fleshy food technology: Processing of fish for smoking, canning and freezing. Curing of meat, Poultry processing, Pasteurization of egg, manufacture of egg Powder and frozen egg products.

**Course Outcomes:**

1. Know the principles of preservation behind the methods of preservation.
2. Understand the stages of sugar cookery, quality of pectin and acidity in the development of preserved fruit products.
3. Acquire skills to formulate fruits based preserved products with value addition for

 nutritional benefits.

**References** :

1. Srilakshmi. B; Food Science, 6th edition, New Age International (P) Limited Publishers, 2015.
2. ShakunthalaManay. N; ShadaksharaSwamy.M; Foods Facts and Principles, 3rd Edition, New Age International (P) Limited Publishers, 2014.
3. Lillian Hoagland Meyer, Food chemistry, CBS Publishers and Distributors, 2004.
4. Subbulakshmi. G and Shobha. A.U; Food processing and preservation, New Age International (P) Limited Publishers, 2014.
5. Norman. N Potter, Joseph H. Hotchkiss, Food Science, 5th edition, CBS Publishers and Distributors, 1996.
6. Sivasankar. B; Food Processing and Preservation, PHI Learning Private Limited, 2011

**OPEN ELECTIVE**

**PAPER-1**

**(To choose 1 out of 3)**

**A. CULINARY SKILLS**

**Objectives**

To enable students,

1. Acquire a sound foundation for healthy cooking
2. Select and correctly use utensils and equipment
3 Learn basic cooking methods

**UNIT-I Introduction**

Meaning of culinary, effect of cooking on food, basic culinary terms.

**UNIT-II Equipment**

Selection and use of equipments, minor equipments and major, equipments in food Preparation.

**UNIT-III Pre preparation procedures**

Washing, soaking, grating, kneading, fermentation, marinating, blanching, Germinating, cutting, coating, Preparation.

**UNIT-IV Methods of Cooking**

Moist heat methods- boiling, stewing, steaming, poaching, Dry heat methods-Baking, frying, grilling, roasting, toasting, Combination method- braising.

**UNIT-V Modern Cooking Methods**

Solar cooking, microwave cooking, electrical cooking.

**Text Books:**

1. Chandrasekhar, U (2002). Food Science and Applications in Indian Cookery. Phoenix Publishing House Private limited.
2. Srilakshmi, B (2002). Food Science. New Age International Limited, New Delhi.

**Reference Books:**

1. Cessarani,V. Kinton,R (2002). Practical Cookery. Seventh edition. Hodder and Stoughton Publishers.
2. Thangam Philip (2005). Modern Cookery. Orient Longmam Limited. Third edition.
3. Sethi, M and Malhan, S.M (2007). Catering Management – An Integrated Approach.Wiley Eastern Limited, Mumbai.

**Journals:**1. International Journal of Food Science Research.
2. International Journal of Food Science and Technology.

**OPEN ELECTIVE**

**PAPER-1**

**B. BASICS FOOD SCIENCE**

**Objectives**

To enable students:

1.Obtain knowledge of different food groups and their nutrient content.

2.Understand the scientific principle of food and apply it in food preparation.

3.Develop new food products ensuring food quality.

**UNIT-I Functions of food, cooking and processing of cereal and pulses**

Food groups, functions of food, principles and need for cooking, water and fat as Medium of heat, merits and demerits. Germination, malting and fermentation, Fortification and enrichment. Structure and nutritive value, cooking of cereals. Nutritive value, pulse cookery and uses, toxic factors, improvement of pulse Protein quality.

**UNIT -II Vegetables and Fruits**

Classification, pigments, composition and nutritive value of vegetables and fruits, Their selection and storage, vegetable and fruit cookery.

**UNIT-III Milk and milk products and eggs**

Composition, nutritive value, different types of milk and milk products, Preservation and milk cookery. Composition, nutritive value, evaluation of egg Quality and egg cookery.

**Unit IV Meat, poultry and fish**

Classification, composition and nutritive value, post mortem changes, aging and Tenderizing. Cooking and preservation of meat, poultry and fish.

**UNIT -V Spices, nuts and oil seeds, Fats, Sugar and sugar products, food Additives and food adulterants**

Classification and uses of spices and condiments, nuts and oil seeds, different Forms of sugar, stages of sugar cookery and its uses in cookery. Processing and Changes in storage and cooking, role of fat in cookery. Types and functions, different food adulterants, measures to control adulteration.

 **Course Outcomes:**

1.Understand the food groups and their functions.

2.Acquire knowledge on different methods of cooking

3.Apply process of different foods

4.Use combination of foods in the development of food products.

5.Identify and control adulterants in various foods and evaluate food quality.

**Text Books:**

1. Chandrasekhar, U (2002). Food Science and Applications in Indian Cookery. Phoenix Publishing House Pvt ltd.
2. Srilakshmi, B (2002). Food Science. New Age International Limited, New Delhi.
3. Rajagopal, M.V., Rao, S.M., Mudambi, S.R. (2013). Food Science. Revised Second Edition. New Age International (P) Limited, New Delhi.

**Reference Books:**

1. Parker, R (2003). Introduction to Food Science. Delmer Publications, U.S.
2. Potter.N. and Hotchkiss.J.H (1998). Food Science. Fifth edition. CBS publication and Distributors Daryaganji, New Delhi.
3. Freeland-Graves, J.H and Peckham, G.C. (1996). Foundations of Food Preparation. Sixth Edition, Englewood Cliffs, N.J., Merill.

**OPEN ELECTIVE**

**PAPER-1**

**C. NUTRACEUTICALS**

**OBJECTIVES**

The Course aims

1. To learn the principle compounds available in various food
2. groups in aiding good health.
3. To gain insights into the functional foods which are in nature
4. To prevent and treat diseases.
5. To vision the impact of globalization on health and food
6. Products.

**UNIT-I Introduction to nutraceuticals**

Definitions,

Synonymous terms.

Nutraceuticals-The link between nutrition and medicine

A brief review of historical and teleological aspects

Basis of claims for a compound as a nutraceutical and

Classifying nutraceuticals.

**UNIT-II Properties, structure and functions of various Nutraceuticals**

Pigments,

Structural lipids

Flavor and odor compounds,

Alkaloids, Terpenoids, Glycosides, Polyphenols, Isoprenoid

Derivatives and Natural antioxidants

**UNIT-III Functional components and health effects of**

Soya, Olive oil, Tea, Common beans, Capsicum annum, Mustards, Ginseng, Garlic, Grape, Citrus fruits, Fish oils, Sea food.

**UNIT-IV Concept and the role of nutraceuticals/functional foods**

a) Nutraceuticals for

- Cardiovascular diseases, Cancer, Diabetes, Cholesterol management, Obesity, Immune enhancement and Endurance performance

b) Mood disorders

- Compounds and their mechanisms of action

- Dosage levels and Contraindications if any etc.

**UNIT -V General idea about role of Probiotics and Prebiotics as nutraceuticals.**

a) Dietary supplements-

- GMPS and shelf life of dietary supplements.

b) Role of changing food preferences and globalization on

selection of nutraceutical products

c) Nutrigenomics

- An introduction and its relation to nutraceuticals

**Course Outcomes:**

1. Understand the developments in the field of nutraceuticals and nutrigenomics.
2. Comprehend the components of functional foods and foods containing nutraceuticals
3. Know the importance of probiotics and prebiotics in human health
4. Understanding the effects of nutrients in molecular level process in the body and the effect of pytochemcials in disease conditions.
5. Articulate and advocate the principle of nutrigenomics in controlling life style diseases.

**References**

1. Mary, K. Schmidl and Theodre, P. Labuza, Essentials of Functional Foods, Culinary and Hospitality industry publication services, 2000.
2. Mazza, G, Functional Foods- Biochemical and processing aspects, Culinary and Hospitality industry publication services, 1998.
3. Robert easy Wildman, Handbook of Nutraceuticals and Functional Foods, Culinary and Hospitality industry publication services, 2001.
4. David, H.Watson, Performance, Functional Foods, Culinary and hospitality industry Publication services, 2003.
5. Chatwick, R et al., Functional Foods, Springer, 2003.
6. Jeffery Horst, Methods of Analysis for Functional Foods and Nutraceuticals, CRS Press, 2002.
7. Paresh, C. Dutta, Phytosterols as Functional Food Components and Nutraceuticals, Marcel DehkerInc, New York, 2004.
8. Guo M. 2009, Functional Foods – Principles and technology, Wood head publishing Company, UK.

**SEMESTER II**

**CORE PAPER - 4**

**ESSENTIALS OF MICRO NUTRIENTS**

**Course Objectives:**

To enable students to :

* Gain a deeper understanding of principles of micro nutrition.
* Develop competence to carry out investigations in nutrition.
* Gain knowledge of the physiological and metabolic role of Vitamins and Minerals.
* Understand the physiological actions of Vitamins and Minerals.
* Aware of the interrelationship of nutrients – Macro and Micronutrients

**UNIT-I : FAT SOLUBLE VITAMINS**

Nomenclature, units and measurements of vitamins and factors influencing the utilization of vitamins.

Vitamins A,D,E,K – Chemistry, Functions, Physiological action, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Source, RDA, Deficiency, Diagnosis of deficiency, Toxicity, Interaction of fat soluble vitamins with other nutrients. Hypo and hyper vitaminosis.

**UNIT-II : WATER SOLUBLE VITAMINS**

Thiamine, Riboflavin, B12, Folic acid, Pyridoxine, Pantothenic acid, Niacin, Biotin, Ascorbic acid – Chemistry, Functions, Physiological action, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Source, RDA, Deficiency, Diagnosis of deficiency, Toxicity, Interaction of water soluble vitamins with other nutrients.

**UNIT-III : MACROMINERALS**

Calcium - Distribution in the body digestion, Absorption, Utilization , Transport, Excretion, Balance, Deficiency, Toxicity, Sources, RDA, Regulation of calcium concentration, Calcium interaction with other nutrients.

Phosphorus - Distribution, Concentration in the body, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Deficiency, Sources, Calcium: Phosphorus ratio.

Magnesium, Sulphur, Chlorine, Sodium and Potassium- Distribution, Concentration in the body, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Deficiency, Sources and RDA.

**UNIT-IV : MICRO AND TRACE ELEMENTS**

Microminerals: Iron, Copper, Iodine, Fluoride, Zinc and Selenium, Chromium Trace elements: Molybdenum, Manganese, Nickel, Chromium and Cadmium - Distribution in the human body, Physiological functions, deficiency, Toxicity and Sources and RDA.

**UNIT- V: HOMEOSTASIS MAINTENANCE**

Homeostasis- Definition, concept s and mechanism

Electrolytes- Electrolyte content of fluid compartments, Functions of electrolyte, Sodium, Potassium and chloride, Absorption, Transport and Electrolyte imbalance, Factors affecting electrolyte balance, Maintainingelectrolytes, Hydrogen ion balance, Distribution of water, Functions of water and Water balance.

**Course Outcomes:**

* Gain in depth knowledge on the physiological and metabolic role of Vitamins and minerals
* Outline the role of vitamins in health and disease.
* Assess the physiological action of vitamins and minerals.
* Acquire in depth knowledge of macro and micro minerals and their role in human health and diseases.
* Enable to understand the inter relationship between vitamins and minerals.

**REFERENCES:**

1. Swaminathan,M. Advanced Textbook on Food Science and Nutrition, Vol:2, Second edition, Reprinted, Bangalore Printing and publishing Co Inc, Bangalore, 2012.
2. Gopalan,C Ramasastry, B.V. and Balasubramanian, S. Nutritive Value of Indian Foods, National Institute of Nutrition, Hyderabad, 2012
3. Swaminathan, M. Essentials of Foods and Nutrition, Volume I and II Ganesh and Co., Madras, 2013.
4. Mahan, Kathleen L. Krause’s Food, Nutrition and Diet Therapy, W.B.Saunder’s, 11th Edition 2010
5. Srilakshmi. E. Nutrition Science, New Age International Publishers, 2018.
6. Recommended dietary intakes for Indian – Indian Council of Medical Research, New Delhi, 2012.

**Journals:**

* Indian Journal of Nutrition and Dietetics
* American Journal of Clinical Nutrition, The American Society for Clinical Nutrition, Inc., USA.
* Annual Reports , National Institute of Nutrition, Hyderabad.
* British Journal of Nutrition, Cambridge University Press, London.
* Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.

**CORE PAPER - 5**

**NUTRITION THROUGH LIFE CYCLE**

**Course Objectives:**

To know

* The computation of Recommended Dietary Allowances
* Impart knowledge on the importance of nutrition during life span.
* Gain knowledge about the nutritional problems and their implications.
* Understand the role of nutrition in different stages of life cycle.
* Comprehend the nutritional requirements for special events

**UNIT-I : RECOMMENED DIETARY ALLOWANCES**

Recommended allowances - RDA for Indians, basis for requirement, computation of allowance based on energy expenditure, components of energy expenditure. General concepts about growth and development through different stages of life.

**UNIT-II : NUTRITION DURING PREGNANCY AND LACTATION**

**Nutrition in Pregnancy**

Stages of gestation, maternal weight gain, complications of pregnancy, maternal physiological changes and adjustments, nutritional problems and dietary management based on RDA for foods and nutrients, importance of nutrition during and prior to pregnancy, teenage pregnancy - nutritional problems and dietary management, planning a menu.

**Nutrition during Lactation**

Physiology of lactation, hormonal control and reflex action, efficiency of milk production, factors influencing volume and composition of breast milk, nutritional composition of breast milk, nutritional concerns during lactation, special foods during lactation, dietary modification, planning a menu.

**UNIT-III : NUTRITION IN INFANCY AND PRESCHOOL CHILDHOOD**

**Nutrition in Infancy**

Infant feeding, nutritional needs, premature infant and their feeding, weaning foods, Feeding problems, infant formulae lactose intolerance, planning menu. Nutrition in Pre-school - Physiological development related to nutrition, feeding problems, behavioural characteristics, nutritional requirement and planning diet.

**UNIT-IV : NUTRITION IN SCHOOL GOING YEARS AND ADOLESCENCE**

Nutrition in school children - feeding school children and factors to be considered. Planning a menu, feeding problems, packed lunch.

Nutrition during Adolescence- changes in growth and development, hormonal influences, Age at menarche - factors affecting age at menarche, psychological problems, body image, disordered eating behaviour, nutritional and menstrual problems, planning a menu.

**UNIT-V : NUTRITION IN ADULTHOOD AND ELDERLY**

**Nutrition in Adult and Elderly**

Nutrition and work efficiency, Nutritonal care and support for Menopausal and Post-Menopausal women, hormonal changes, and planning a menu.

Physiological changes in aging - Psycho-social and economic factors affecting eating behaviour, knowledge and belief, institutionalization, common health problems, nutritional requirement, modification in diet, modification of diet for elderly.

**Course Outcomes:**

* Identify the nutritional deficiency symptoms among the population
* Prevent and alleviate nutritional deficiencies common among population
* Gain knowledge to formulate weaning foods, packed lunch and age/activity specific diets adequate in quality and quantity
* Understand and tackle age specific food related problems and eating behaviours

**REFERENCES:**

1. Swaminathan,M. Advanced text book on Food and Nutrition, , Anmol Publication Pvt,Ltd, Second Edition.2014.
2. Gopal,C.Kamalakrishnaswamy, Nutrition in Major Metabolic Disease, Oxford India Paper backs Publisher First Edition 2000.
3. Srilakshmi, B. Nutrition Science, New Age International [p] ltd, New Delhi, 2018.
4. Mahtab S.Bamji, Prasad Rao, N.Vinodini Reddy. Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt .Ltd, Second Edition, 2013.
5. Sumati. R. Mudambi, M.V Rajagopal., Fundamentals of Foods & Nutrition, 4th Edition New age International publishers New Delhi, 2006.
6. Melvin H. Willams., Nutrition for health fitness & Sport. 5th edition Mcgraw –Hill, publishing Co., 1999.

**CORE PAPER - 6**

**FOOD MICROBIOLOGY**

**Course Objectives:**

To enable the students to:

* Learn about the morphology of different microorganisms.
* Study various types of food spoilage ,poisoning and infection caused by microorganism caused by microorganism
* Acquire knowledge and understand the relevance of microbiology and its application in food industry.
* Gain knowledge about food additives and contaminants
* Understand the importance of food safety and quality management in food processing.

**UNIT-I**

Types and Classification of microorganism, and important micro-organisms in foods, morphology of yeast, mould, bacteria, virus, algae and protozoa.

**UNIT-II**

Micro-organisms and food: Their primary sources in foods, cultural characteristics and biochemical activities. Airborne bacteria, fungi Microorganisms found in soil Normal flora of skin, nose, throat, GI tract

**UNIT-III**

Food in relation to disease - food born diseases, food infection, intoxication, microbial toxins - types, bacterial poisoning and infection - causative agents and sources , symptoms and prevention of Staphylococcal food poisoning, botulism, salmonella, bacillus infection, E.coli, food poisoning of fungal origin - ergotism, aflatoxin.

**UNIT-IV**

Control of microorganism - Principles of preservation, General principles underlying spoilage of foods. Preservation by high and low temperature, chemical preservatives, salt, sugar as preservative, new trends in preservation.

**UNIT-V**

Sterilization by Physical agents - Heat, moist heat, fractional sterilization, pasteurization, other types of sterilization, chemical sterilization. Microbiology of water, typical organisms in water, types of bacterial examination for water, water treatment.

**Course Outcomes**

1. Understand the general morphology and the growth inhibiting and promoting factors for microorganisms.
2. Categorize the sources, contamination and type of spoilage
3. Enumerate food poisoning food born hazards and food intoxication of microbial origin to ensure food safety.
4. Learn about the Principles of preservation by high and low temperature and new trends in preservation

Gain knowledge in Sterilization by Physical agents, types of sterilization,. Microbiology of water, bacterial examination for water and water treatment

**REFERENCES:**

1. Pelczar, M.I and Reid, R.D, Microbiology, MC Graw Hill Book Company, New York,
5th edition, 1993.
2. Atlas M.Ronalds , Principles of Microbiology, 1st edition, Mosby - year book Inc, Missouri, U.S.A, 1995.
3. Frazier, W.C, Food Microbiology, MC Graw Hill Inc 4th edition, 1988.
4. Banwart , Basic Food Microbiology, 2nd edition CBS Publisher, 1989.
5. Bensaon, H.J, Microbiological applications, C. Brown publishers, U.S.A, 1990.

**CORE PRACTICAL I**

**ADVANCED FOOD SCIENCE**

**Course Objectives:**

* Understand the physio chemical changes in foods with the effect of cooking
* Develop skill to explore the microscopic structural changes in starch and sugar crystals
* Develop skills to prepare recipes based on the physio chemical changes in foods
* Understand the effect of acid, alkali and heat on the cooking of pulses, vegetables and meat
1. Cereal cookery - Preparation of rice based products - Idli, Dosai and Appam to study the effect of fermentation and soaking.
2. Preparation of wheat based products - Chappathi, phulkas, poories - with different proportion of wheat flour - study the development of gluten.
3. Pulse cookery - Effects of soaking, acid , alkali and sprouting and different methods of cooking on cooking time and quality of pulses.
4. Vegetable cookery - Effect of acid, alkali and methods of cooking on pigments present in vegetables.
5. Fruits- determination of strength of pectin.
6. Egg, meat, fish, poultry - Methods of cooking on acceptability of the various fleshy foods preparation, foam formation and factors affecting foam formation. effect of cooking temperature and methods on colour, texture of tender and tough cuts of meat.
7. Fats and oils - Smoking point of different fats and oils - Determination of optimum temperature for frying of different oils, factors affecting fat absorption.
8. Sugar cookery - Stages of sugar cookery, use of sugar in Indian recipes. Crystallization and factors affecting crystallization.

**Course Outcomes:**

* Develop the culinary skills in the preparation of recipes and different stages of sugar cookery
* Demonstrate the effect of fermentation of batter
* Recognize the reactions of food components due to the effect of acid, alkali and heat on the cooking of pulses, vegetables, egg and meat
* Apply the knowledge and skill to identify the microscopic structures of starch and sugar crystals

**ESSENTIALS OF MACRO NUTRIENTS**

(Processed and unprocessed sample)

1. Qualitative analysis – Identification of pentoses, hexoses, Dextrin, starch, glycogen present in the given solution.
2. Quantitative analysis
3. Estimation of fat by Soxhlet method
4. Estimation of Total protein by Microkjeldhal method
5. Extraction of lipids from egg yolk

**CORE PRACTICAL - II**

**ESSENTIALS OF MICRO NUTRIENTS**

**Course Objectives:**

To enable the students

* Estimate the nutrient contents of foods
* To know analytical techniques in quantitative estimation of nutrients
* To plan, prepare and evaluate a day’s diet for various age groups
1. Preparation of ash solution.
2. Estimation of calcium in foods.
3. Estimation of phosphorus in foods.
4. Estimation of iron in foods.
5. Estimation of ascorbic acid in foods by dye method.
6. Estimation of thiamine in food by fluorimetry.

**Course Outcomes:**

* Acquire the knowledge on diagnostic level of blood and urine biochemical parameters.
* Learn the analytical techniques in biochemical assessment of nutritional status.
* Analyze blood and urine biochemical parameters and depict nutritional status.
* Demonstrating skills for the estimation of blood and urine biochemical parameters.

**NUTRITION THROUGH LIFE CYCLE**

A. Menu planning, Preparation and Presentation of a day’s menu for

1. Pregnant woman
2. Lactating mothers
3. Infants ages 9 months
4. Pre-schools children
5. School going children
6. Adolescents
7. Adult of different working category
8. Elderly

**CORE ELECTIVE**

**PAPER-2**

**(To choose 1 out of 3)**

1. **FOOD STANDARD AND QUALITY CONTROL**

Objective: To enable the students to

1. Study about the control of quality and use of additives.
2. Gain Knowledge on standards for food quality and food laws.
3. Know about food safety measures and food labelling.

UNIT-I

Principles of Quality control of food –Raw material, processed and finished product Inspection. Leavening agents – classification, uses and optimum levels. Food additives – Preservatives, colouring, flavouring, sequestering agents, emulsifiers and antioxidants.

UNIT-II

Standardisation systems for quality control of foods-National and International Standardization system, Food grades, Food laws-compulsory and voluntary standards. Food Adulteration – Common adulterants in foods and tests to detect common adulterants.

UNIT-III

Methods for determining quality – Subjective and objective methods. Sensory assessment of Food quality-appearance, colour, flavour, texture and taste, different methods of sensory Analysis, preparation of score card, panel criteria, sensory evaluation room.

UNIT-IV

Food safety, Risks and hazards: Food related hazards, Microbial consideration in food safety,

HACCP-principles and structured approach. Chemical hazards associated with foods. FSSAI

UNIT-V

Principles of labelling, nutrition labelling, Food packaging- principles, functions and types

(metal, glass and flexible films), merits and demerits of packaging materials.

**Course Outcome:**

1. The control of quality and use of additives is known.
2. Knowledge on the standards for food quality and food laws is obtained.
3. Discuss on the food safety measures and importance of food labelling in the food
4. Items purchased.

**Text Books**:

1. Roday, S. (2011) Food Hygiene and Sanitation, 2nd Edition, Mac Grawhill Publication New Delhi.
2. Joshi, S.A. (2010) Nutrition and Dietetics with Indian Case Studies. Tata McGraw Hill Education Pvt. Ltd., Mumbai.
3. Manay, S.N. and M. Shadaksharawamy, 2001. (Eds) Foods, Facts and Principles. 3rd

Edition, New Age International. New Delhi.

1. Begum, R. (2006) A Textbook of Foods, Nutrition and Dietetics. Sterling Publishers

Pvt. Ltd. New Delhi.

**Reference Books**:

1. Mudambi, S.R. and M.V. Rajgopal 2006. Fundamentals of Foods and Nutrition. Wiley Eastern Ltd.
2. Vijaya Ramesh, Food Microbiology, MJP Publications, 2007.
3. David, A. Shapton, and Naroh F. Shapton (2011) Principles and Practices for the Safe Processing of Foods, Heineman Ltd., Oxford.

**CORE ELECTIVE**

**PAPER-2**

1. **HOSPITAL FOOD SERVICE**

**Objectives**

To enable students

1. Understand the principles of planning, organizing and controlling hospital food service.
2. Develop skills in meal planning, production and service.
3. Understand the principles of sanitation and hygiene.

**UNIT I**

Types of service in hospitals – Food service definition and its types, equipment used for Serving the food in hospitals.

**UNIT II**

 Physical requirements: Kitchen area – Size and type of kitchen, design of kitchen,

Ventilation, lighting, flooring, carpets, wall covering and sample layout of kitchen.

Storage area –Equipment – Equipment required.

**UNIT III**
Purchasing – Meaning of purchase and buying methods.

Receiving & Storing – Importance of receiving raw materials .

Production – Menu planning for patients and process of food production.

Holding of foods – methods.

**UNIT IV**

Management – Definition, principles and techniques of effective management,

Leadership and managerial abilities (in a hospital & dietary).

Tools of management – organisational chart of the food service team of the hospital.

**UNIT V**

 Accounting – Definition and principles. Journal and ledger. Book of account – Cash

Book, purchase book, sales book, purchase returns & sales returns book.

**Course Outcome**

1.Understand the principles of food service

2.Gain knowledge on meal planning

3.Describe thehygiene and sanitation followed in food service unit

4.Distinguish tool of management

**Reference Books:**

1. Sethi M and Mahan S.-Catering Management an integrated approach , 2006, 2nd edition, John Wiley & Sons, New York.
2. Tersel MC and Harger - Profession food preparation , John wiley & Sons, New York.
3. Joan C Boason , Lennox M.-Hotel, hostel & hospital housekeeping , 2004, 5th edition, Book Power publishers, New York.
4. Mcswane D, Linton R - Essentials of food safety & sanitation, 1998, Prentice hall international, London

**CORE ELECTIVE**

**PAPER-3**

1. **TEXTILES AND CLOTHING IN HUMAN CARE**

**Objectives**

1.To enable students gain knowledge on fibre and yarn.

2.To familiarise with fabric construction.

3. To apprehend on care and maintenance of fabrics.

**UNIT I**

Fibre Types

Natural –cotton, flax/Linen, Jute, Ramie, Hemp

Manmade – cellulosic, manmade synthesized fibre, mineral and

Elastomeric

Processing and manufacture of fibres

Properties –Physical and Chemical

Fiber identifications –visual inspection, burning test, microscope test,

Soluble test

Applications of fibers

**UNIT II**

Yarn-Definition

Classification –simple and complex

Testing and Identification of yarn

Yarn twist

Uses of yarn in various fabrics

**UNIT III**

Fabric construction-Definition

Types –woven, non-woven, knitted

Construction techniques

Merits and demerits

**UNIT IV**

Stain removal and its techniques

Solvents – Oxidizing solvents, Reducing solvents, Lacquer solvents,

Inert solvents, Detergents, Acids, Alkalis

Application of solvents

Types of stains and removal- Dye stains, Protein stains, combination

Stains, Dairy product stains, fruit stains, mud stains, coffee stains.

**UNIT V**

Laundering and Laundering Agents

Laundering – Types, Principles, methods and process

Laundering agents -Stiffening agents, Bleaching agents, Fabric Softeners

Dry cleaning –Procedure, advantages and disadvantages

**Course outcome:**

On completion of the course, students should be able to

1.Classify the fibres and explain its properties.

2.Assess the types and properties of yarns.

3.Compile the fabric construction techniques.

4.Describe the process and agents in stain removal.

5.Determine the laundering procedures for various fabrics.

**References**

**Text Books:**

1. Branson, Joan C & Lennox, Margaret-Hotel, hostel and hospital housekeeping, 1973 Edward Arnold, London.
2. DeepaliRastogi and Sheetal Chopra -Textile Science, 2017, Orient Blackswan Private Limited.
3. SeemaSekhri – Textbook of Fabric science, second edition, 2016,Prentice hall India learning Private Ltd

**Reference Books:**

1. Bev Ashford – Fibers to fabrics, 2016,AuthorHouseUK.
2. Premony Ghosh- Fibre science and Technology,2003, McGraw Hill Education
3. PremlataMullick-Text book of home science, 2000, Kalyani Publisher.

**Web Resources:**

1. http://textilelearner.blogspot.com/2011/10/textile-ebooks-free-download-html

2. https://www.textilemates.com

**OPEN ELECTIVE**

**PAPER-2**

**(To choose 1 out of 3)**

**A-BAKERY SCIENCE**

**Objective**:

To enable the students

1. Understand the science and technology of baking
2. Understand the role of different ingredients in baking
3. Develop skills in planning and maintenance of a bakery institution

**UNIT I**

Baking - Definition, Principles of baking, classification of baked foods. Types of equipments In baking industry, cleaning and sanitizing methods of baking equipments, baking. Temperature of different products, operation techniques of different baking equipments.

**UNIT II**

Ingredients and Their Role in Baking - Flour, Yeast, sugar, egg, butter, salt, baking powder, Colouring, flavouring agents. List of standard colouring and flavouring agents.

**UNIT III**

Preparation of baked foods - Quick breads, cakes and its varieties, different types of biscuits, Cookies and pastries.

**UNIT IV**

Decoration of baked foods – Icing- Types of Icing used in different bakery product. Role of Other ingredients used in icing.

**UNIT V**

Baking unit/ plant layout and design of a baking unit sanitation and hygiene. Types of

Packaging materials used for bakery products, method of packaging.

**Course Outcomes**:

1. An understanding about ingredients used for baking and how their characteristics are
2. Gain knowledge about the appropriate preparation, mixing, make-up, baking, decorating and presenting of baked products.
3. Describe and apply appropriate sanitation, health and safety practices in baking
4. Demonstrate the safe operation, cleaning, maintenance and storage of baking equipment and utensils

**Text Books:**

1. Potter M,N. and Hotchkiss, J.H. (1998) Food Science 5th edition, CBS Publications and

Distributors, Daryaganji, New Delhi.

1. Dubey, SC, (1979) Basic Baking Science and Craft, Jwalmukhi Job Press, Bangalore.

**Reference Books**:

1. Baker‟s Handbook on practical Baking .Wheat Associates, USA, New Delhi.
2. Modern Pastry Chab, Vol.I and II, A VI Publishing Co., Inc., West Port, Connecticut, 1977.

**OPEN ELECTIVE**

**PAPER-2**

**B. HOME SCALE PRESERVATION OF FRUITS AND VEGETABLES**

**Objectives**:

1. Understand the methods of food preservation

2. Gain knowledge related to sugar, salt and chemicals as a preservative

3. Learnt the importance of moisture removal and fermentation in home scale preservation

**UNIT - I Introduction to Food Preservation**

Basic Principles of Food Preservation, Types of Spoilage, Importance of Food Preservation Different Methods of Food Preservation

**UNIT - II Preservation by using Sugar**

Sugar concentrates, Preparation of Jam, Jelly, Marmalades, Preserves, Candied, Glazed, Crystallized Fruits, FPO Specification, Problems Encountered, Spoilages

**UNIT-III Preservation by Removal of Moisture**

Sun drying Drying ,Dehydration, Method of Drying, Preparation of Vegetable

Vathals - Ladies Finger, Brinjal, Beans, Cluster Beans, Preparation of

Vadams – Rice vadam, Sago Vadam, Rice Flakes Vadam, TomotoVadam

**UNIT-IV Preservation by using Chemicals and Salts**

Chemical Preservatives – Definition, Types of Preservatives, Preparation and Preservation of

Fruit Juices, Picking – Principles Involved, Process, Types

Preparation of Various Types of Pickles – Lime, Mango, Ginger, Capsicum, Mixed Vegetables,

Brinjal, Onion, Garlic

**UNIT- V Fermentation**

Definition, Types of Fermentation, Common Fermented Foods – Cheese Making, Dokhla,Wine

**Course Outcomes:**

1. Gain expertise to preserve fruits and vegetables at home scale level

2. Apply the skill in improving the quality of the preserved food products

3. Excel in the field of applying fermentation techniques

4. Enhance the knowledge on usage of sugar, salt and chemicals in fruits and vegetables

5. Become as an entrepreneur in small scale food industries.

**Text books:**

1. Adams, M.R. and Moss, M.O. (2005) Food Microbiology, New Age International (P)

Ltd., New Delhi,.

2. Usha Chandrasekhar, (2002)Food Science and Applications in Indian Cookery, Phoenix

Publishing House Pvt. Ltd., New Delhi,.

3. Srilakshmi, B.(2013) Food Science, New Age International (P) Ltd., New Delhi.

**Reference Books:**

1. Fellows, P. (2000) Food Processing Technology, Principles and Practice, 2nd Edition,

CRC Press, Woodland Publishing Ltd., Cambridge, England,

2. Sommers, C.H. and Xveteng Fan, (2006) Food Irradiation Research and Technology,

Blackwell Publishing, 2006.

3. Swaminathan,M. Food Science, Chemistry and Experimental Foods, Bappco

Publishers2013,

**OPEN ELECTIVE**

**PAPER-2**

**C. LIFESTYLE PRACTICES**

**Objectives**

To enable students:

1. Recollect the developmental stages of human beings and the importance of

nutrition

2. Collate the influence of lifestyle on health status.

3. Learn healthy life style practice

**UNIT-I Introduction**

Balanced diet, food groups, menu planning objectives of menu planning, steps in

menu planning, association between health and lifestyle.

**UNIT-II Healthcare in pregnancy and lactation**

Stages of pregnancy, nutrition during pregnancy, lactation process, nutritional

needs during lactation. Dietary guidelines during pregnancy and lactation.

**UNIT-III Healthcare during infancy and early childhood**

Nutritional needs, importance of breast feeding, supplementary foods and

nutritional requirements for infancy and childhood.

**UNIT-IV Healthcare during School going and Adolescence**

Growth pattern, nutritional needs, importance of healthy snacking, correct food

choices, dietary guidelines.

**UNIT V- Healthcare in adulthood and old age**

Lifestyle and degenerative diseases

Nutritional requirements and healthy lifestyle practices for adult and elderly.

**Course Outcomes:**

1 Relate nutritional requirement for various stages of life.

2 Plan a balanced diet.

3 Distinguish between healthy and unhealthy life style practices.

4 Correlate life style practices with health outcomes.

5 Practice and promote healthy life style practices.

**Text Books:**

1. Garrow, J.S, James, W.P.T and Ralph, A (2000). Human Nutrition and Dietetics.

Churchill Livingston.

2. Robinson, B.W. Williams, S.R (2000). Nutrition through lifecycle. McGraw hill

higher education, New York.

3. Drummond, K.E and Brefere, L.M (2004). Nutrition for food service and culinary

professionals. John wiley and sons, New York.

**Reference Books:**

1. Mahan, L.K and stump. S.E (2004). Krause‟s, Food nutrition and Diet

therapy.W.B.Saunders co.

2. Nutrition Dietician and Health Management, Air Cmde.L.K.Sharma, 1st

 edition,2012.

Published by Surendrapublictions.

3. Nutrition of child, pregnant and lactating mother, Anupama Rani,1st edition, 2010

published by Sonali publications.

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