

**MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI**

PG - COURSES – AFFILIATED COLLEGES

Course Structure for M.Sc. Nutrition & Dietetics with Hospitality Management
(Choice Based Credit System)

(with effect from the academic year 2021- 2022 onwards)

Se m. (1)	Sub . No. (2)	Subject Status (3)	Subject Title (4)	Contact Hrs./ Week (5)	Credits (6)
I	1	Core - 1	Advances in Diet Therapy-I	6	4
	2	Core - 2	Advanced Food Science -I	6	4
	3	Core - 3	Nutritional Physiology	5	4
	4	Core - 4	Post Harvest Technology	5	4
	5	Core – 5 Practical - 1	Advances in Diet Therapy- I	4	2
	6	Core - 6 Practical – 2	Advanced Food Science	4	2
	Subtotal				30
II	7	Core - 7	Advances in Diet Therapy - II	5	4
	8	Core - 8	Computer Application in Nutritional Research	5	4
	9	Core - 9	Human Factors and Ergonomics	4	4
	10	Core - 10	Food Processing	4	4
	11	Core - 11	Field Work	4+	3
	12	Core - 12 Practical - 3	Advances in Diet Therapy- II	4	2
	13	Core - 13 Practical - 4	Computer Application in Nutritional Research	4	2
Subtotal				30	23

Sem. (1)	Sub No. (2)	Subject Status (3)	Subject Title (4)	Contact Hrs./ Week (5)	Credits (6)
III	14	Core - 14	Biochemical Changes in Diseases	6	4
	15	Core - 15	Sports Nutrition	6	4
	16	Core - 16	Research Methodology	5	4
	17	Core - 17	Food Safety and Sanitation	5	4
	18	Core - 18 Practical - 5	Biochemical Changes in Diseases	4	2
	19	Core - 19 Practical - 6	Internship Training	4	2
	Subtotal				30
IV	20	Core - 20	Functional Foods and Nutraceuticals	4	4
	21	Core - 21	Food Microbiology	4	4
	22	Core - 22	Nutrition For Fitness and Health	4	4
	23	Core - 23 Practical - 7	Functional Foods and Nutraceuticals	4	2
	24	Core - 24 Practical - 8	Food Microbiology and Sanitation	4	2
	25	Elective - 1	Field Work	4+	3
	26	Core - 25	Project	6+	8
	Subtotal				30
Total				120	90

Advances in Diet Therapy-I

Objectives

The Course aims

- To facilitate the students to realize the principles of diet.
- To expertise in the dietary modifications for different diseases.
- To develop the proficiency of becoming successful clinical dietitians.

Unit I

Clinical Nutrition and Dietetics

- a) Definition and history of dietetics.
- b) Dietitian as part of the Medical Team
- c) Nutritional Screening and care - Nutritional Assessment – Diagnosis - Intervention and evaluation.

Diet, Nutrient and Drug Interaction

- a) Effect of drugs on ingestion, Digestion, Absorption and metabolism of nutrients.
- b) Effect of foods, nutrients and nutritional status on drug dosage and efficacy.

Diet Modifications

- a) Normal diet as a basis for therapeutic diets, Modification of Normal Diet and various nomenclatures of standard hospital diets
- c) Hospital diet - Scope and importance - Routine hospital diets - Normal / General diets - Liquid diets and formula diets - Soft diets and bland diets

Unit II

a) Dietary management in critically ill patients - Nutritional status assessment of the critically ill patients. Recent advances in techniques and feeding substrates. Enteral Nutrition support - Site, Different tube sizes, Different types of feeds, Composition and Delivery methods and its complications.

Parenteral Nutrition - Type of access, parenteral nutrition solutions/composition - Administration methods, Monitoring & complications.

b) Dietary management in Febrile condition Classification and etiology of fever/infection, symptoms, diagnostic tests, Metabolic changes during infection and dietary treatment for - Typhoid, Influenza, Malaria, Tuberculosis and HIV & AIDS

Unit III

a) **Metabolic Stress and Cancer** -Metabolic and clinical aberrations, diagnosis, complications, treatment, MNT and dietary counselling in Burns, Sepsis with or without Multiple Organ Dysfunction Syndrome (MODS) and Trauma, Critical care, Cancer- General and Specific cancers, Effect of Cancer therapy on MNT, Etiology and Signs and symptoms, and diagnosis of cancers, Cancer therapy and its complications- Chemotherapy, Radiation therapy and Surgery. Dietary management for cancerpatients.

b) **Dietary management in Surgery** -Nutrition in wound healing, Stage ofConvalescence, Dietary management for pre and post- surgical diets

c) **Dietary management in deficiency diseases** Aetiology, Symptom and Diagnostic tests and Dietary treatment for PEM, Vitamin A and Anaemia

Unit IV

a) **Dietary management in Weight Imbalance**- Prevalence and Classification, Components of body weight, Guidelines for Calculating Desirable body weight.

b) **Dietary management in Obesity**- Etiology, Classification and Energy balance, Physiology of the obese state & Clinical manifestations, Risk factors, Complications and Lifestyle modifications, Nutraceuticals and Dietary management

c) **Dietary management in Underweight**- Etiology and dietarymanagement

d) **Dietary management in Eating disorders**- Definition, Signs and symptoms and Complications/health risks, Diagnostic criteria and nutrition management inAnorexia Nervosa and BulimiaNervosa.

Unit V

. a) **Dietary management in allergy**-Definition, Symptoms and Diagnostic tests ,Common food allergens and Mechanism of food allergy, Elimination diets, Milk allergy in infants and prevention of food allergy.

b) **Dietary Management in Nervous System Disorders**- Etiology and Clinical features and Dietary management for - Parkinson's disease and Alzheimer's disease

c) **Dietary Management in Bone Health disorders**- Prevalence, Types and Etiology and Role of Calcium, Phosphate & Vitamin D in Osteoporosis and Osteomalacia. Measurement of Bone Mass Using Bone Mineral Density (BMD) and Peak Bone Mass(PBM).

References :

- Antia F.P. And Philip Abraham-Clinical Nutrition and Dietetics, 2001, Oxford PublishingCompany.
- Swaminathan S- Advanced Textbook On Food & Nutrition, 2015,Bappco
- B. Srilakshmi- Dietetics, 2019, 8thEdn, New Age International Pvt. Ltd. NewDelhi.
- Mahan L.K., Sylvia Escott-Stump - Krause's Food Nutrition and Diet Therapy 10th Edition, 2001,W.B. Saunders CompanyLondon.
- Passmore P. And M.A. East Wood - Human Nutrition and Dietetics, Churchill Living Stone.

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- Raheena M. Begum - A Text Book of Foods Nutrition and Dietetics , 3edition 2009, Sterling Publishers Pvt. Ltd
- Robinson Ch., M.B. Lawlea, W.L., Chenoweth, And A.E., Carwick : Normal And Therapeutic Nutrition, 17 thEdn, Macmillan Publishing Company.
- Shills and Young- Modern Nutrition In Health And Disease, 2012, Lippincott Williams and Wilkins.
- Bennion M.: Clinical Nutrition, John Wiley & Sons.
- Whitney, E. N. and C. B. Cataldo, Understanding Normal and Clinical Nutrition, 1983, West Pub.
- Williams S. R. Essentials of Nutrition and Diet Therapy, 4th edn, 1986, Mosby College Pub. S. Louis.

ADVANCED FOOD SCIENCE - I

Objectives:

- To recognize the nutritive value of foods.
- To comprehend the principles and chemistry of foods and apply the principles during preparation and cooking
- To understand the nutrient conservation and loss during cooking

Unit I

Introduction to Food Science

- a) Introduction to food science as a discipline and modern developments, Objectives of cooking, Different methods of cooking, Functions of food

Role of Water in Foods

- a) Free water and bound water, Functional Properties, Water Activity, Intermediate Moisture Foods.

Unit II

Sensory Evaluation of Foods

- a) Laboratory set up, equipment
- b) Panel selection and training, judging quality
- c) Subjective evaluation techniques, Difference tests: paired comparison test, duo-trio test, triangle test
- d) Rating tests – Ranking single sample, Two sample and Multiple sample difference tests
- e) Rating tests – Hedonic scaling, Numerical scoring, Composite scoring
- f) Sensitivity tests and Descriptive tests, analysis of sensory data
- g) Objective tests to assess sensory properties of foods:
- h) Measurement of colour
- i) Measurement of viscosity, consistency, texture

Properties of Foods

Physico-chemical properties of foods- Organic food components, colloids, osmotic pressure, food dispersions (sols, gels, emulsion, foam), Hydrogen ion concentration.

Unit III

Cereals and Millets

- a) Nutritive value, parboiling, Cereal cookery. Gluten- factors affecting glutenformation
- b) Sugar - Sources, uses,properties
- c) Crystallization- Factors affectingcrystallization
- d) Stages of sugar cookery in candy making, Amorphous and Crystalline candies,Syrups
- e) Starch granules -structure and characteristics, effect of moist and dry heat, non starch polysaccharides (fibres, cellulose, hemicellulose, pectic substances, gums, Carboxy MethylCellulose(CMC)
- f) Starch, hydrocolloids and gums-occurrence, functions in food systems, properties, gelatinization, retrogradation and modifiedstarches.

Pulses, Nuts and Oilseeds

- a) Nutritive value,processing
- b) Functional properties of proteins: modified proteins
- c) Applicationinproductformulation-proteinfoodsforinfantsandchildren,soyproducts, protein concentrates and isolates, textured vegetableproteins.
- d) Fats and oils -Properties, manufacture, uses in food systems (as cooking media and shortening). Rancidity- types, mechanism and prevention. Uses of fat replacers in processedfoods.

Unit IV

Vegetables and Fruits

- a) Nutritional importance, pigments and acids in vegetables andfruits
- b) Effect of cooking on pigments andnutrients.
- c) Enzymaticandnon-enzymaticbrowningreactions,mechanism,methodofprevention, relationship tohealth.

Milk and Flesh Foods

- a) Composition, processing, effect of heat, acid and enzymes in milk, milk products, cheesemaking
- b) Composition, post-mortem changes in meat, changes produced during cooking, spoilage
- c) Importance of fish,spoilage
- d) Effect of heat on egg proteins, egg foams, factors influencing foaming and egg products.

Unit V

Enzymes and Food Technology

- a) Enzymes- definition, classification, specificity of enzymes, enzyme inhibition, allosteric enzymes
- b) Application of enzymes in food industry.
- c) Fermentation technology: different fermented products
- d) GM foods, novel foods, SCP, spirulina, Mushroom

Food Product Development and Patenting

- a) Definition, Significance, Future trends in Product Development and Formulation
- b) New Technologies driving the food product development
- c) Steps involved in product development
- d) Food product standardization
- e) Patenting of foods
- f) Conditions to be satisfied by an invention to be patentable, Inventions which are not patentable in India

Filing a patent application, Documents to be submitted by a patentee, Criteria for naming inventors

REFERENCE

1. Potter, N. Hotchkiss, H.J, Food Science, 5th edition, CBS publishers and distributors, New Delhi, 1996.
2. Srilakshmi, B, Food Science, New Age International Pvt. Ltd., Chennai, 2006
3. Beckhan. C. and Graves. H.J, Foundations of food preparations, Macmillan Publishing Co, New Delhi, 1979.
4. Sumathi. M.R, Food Science, New Age international Pvt Ltd, 1997.
5. Manay. N.S and Shadaksharaswamy. M, Foods-Facts and Principles, 2002, New Age International Pvt. Ltd, New Delhi.

NUTRITIONAL PHYSIOLOGY

Objectives

- To understand the current state of knowledge about the functional organization of the human body.
- To be able to correlate physiology with various disorders and their pathogenesis

Unit I

Movement and Coordination

- a) Organization of Body- Structure of skeletal and smooth muscle and Physiology of muscle contraction.
- b) Structure of Brain and Neurons. Physiology of nerve impulse conduction, excitability of membranes, electrical and chemical transmission between cells.
- c) Sensory organs and their functions.
- d) Hormones: Classification, synthesis, regulatory functions and mechanism of hormone action. Prostaglandin- structure, biosynthesis, metabolism and biological action and their role in pathology.

Unit II

Digestion and Respiration

- a) Physiological basis of Nutritional Biochemistry
- b) Structure of digestive tract, enzymes in digestion, mechanical and biochemical aspects of digestion, absorption and transport of major nutrients.
- c) Liver: Role of liver in processing and distribution of nutrients absorbed from SI, excretory functions and storage.

- d) Lungs- Structure, Physiology of respiration, Exchange and transport of gases and its regulation.

Unit III

Transport and Defence

- a) Blood: Composition- plasma, blood cells, haemoglobin, blood clotting process.
- b) Heart : beat, initiation , conduction and regulation, physiology of circulation
- c) Immunity: Immune response, antibody, cell mediated and humoral immunity complement system.

Unit IV

Excretion and Detoxification

- a) Kidney and Nephron- Internal structure
- b) Fluid and electrolyte balance, Acid Base balance
- c) Physiology of Excretion, Role of kidney in body water regulation.
- d) Detoxification: Definition, xenobiotics, enzyme systems involved mechanism of detoxification.
- e) Oxidative stress and antioxidants: Free radicals- definition, formation in biological systems, defence against free radicals. Role of free radicals and antioxidants in health and disease

Unit V

Reproduction

- a) Male reproductive organs – structure and functions, Reproductive health and nutritional requirements
- b) Female reproductive organs- structure, functions, Physiology of Menstruation, puberty, menarche and menopause
- c) Physiology of Pregnancy and Lactation- organs, fertilization, conception, implantation.
- d) Male and female contraception
- e) Aetiology of male and female infertility

REFERENCE

1. Ganong W.F.(2003)-Review of Medical Physiology. 21st ed. McGrawHill.
2. Guyton A.C. and Hall J.E.(2000)Textbook of Medical Physiology. 10th ed.India: HarcourtAsia..
3. Tortora G.J and Grabowski S.R.(2000) Principles of Anatomy and Physiology. 9th ed. John Wiley and Sons.Inc.
4. Chaudhari S K(2000) Concise Medical Physiology. 3rd Edition. Central.
5. West J.B.(1996): Physiological Basis of Medical Practice. 12th Edition. B. I. Waverly Pvt.Ltd.

POSTHARVEST TECHNOLOGY

Course Objectives:

The main objectives of this course are to:

Gain knowledge about postharvest technology which enables storage of food grains and explain the causes of postharvest food losses and the preventive measures

Unit: 1

INTRODUCTION TO POST HARVEST TECHNOLOGY

Introduction to Post Harvest Technology - Definition, importance and problem encountered. Buffer stock – definition, quantity of stores available. Governmental measures to augment food production- need for food conservation. Food loss in the post-harvest period, extent of losses, loss in the field, threshing yard, storage, marketing loss. Role of Post-Harvest Technology in combating malnutrition in India.

Unit: 2

AGENTS CAUSING FOOD LOSSES

Agents Causing Food Losses - Physical agents, (moisture, temperature), Chemical losses, biological losses- insects- insects attacking food grains - types and life cycle, damage caused to food grains and detection of insect infestation, rats and rodents, birds, animals-Nature of damage, identification.

Unit: 3

CONTROL OF SPOILAGE AGENTS

Control of Spoilage Agents - Importance and methods of sanitary handling, physical, chemical, biological and other means of control of insects, rats and rodents and birds. Insect control methods Physical methods and chemical methods including fumigation techniques. Handling and Transport of Food Commodities - Traditional and improved methods. Nutrient losses in spoiled grains and National program to save grains.

Unit: 4

STORAGES OF GRAINS AND AGENCIES CONTROLLING FOOD LOSSES

Storage of Grains - Importance of storage structures- requirements, traditional and modern and underground and above ground storage and their improvements, FCI godowns. PDS. Agencies Controlling Food Losses - Role of SGC, FCI, CWC, SWC, IGSI in controlling food losses

Unit: 5

FOOD PROCESSING

Food Processing of Selected Food Items – wheat, rice, breakfast cereals, pulses and oilseeds.

Advances in Diet Therapy-I

1. Routine hospital diet, Regular diet, Light diet, Soft diet, full liquid diet, Bland diet, Formula diets available in markets. Write suitable recipes for the above modified diets
2. Preparation and laboratory trial of formulas for enteral feeding-Home based and commercial supplement feeds.
3. Diet in fevers and infections – Typhoid, Malaria and Tuberculosis
4. Planning and preparation of diet for HIV with and without comorbidities
5. Diet in deficiency diseases - Anaemia, vitamin A and PEM
6. Planning and preparation of diet for the cancer patient based on the treatment and other conditions
7. Preparing nutrient dense -high calorie and high protein recipes and preparing high fiber low calorie recipes for Pre & post Bariatric Surgery patients
8. Diet therapy for post burn condition
9. Planning diet for Obesity and underweight individuals.

ADVANCED FOOD SCIENCE- I

Demonstration on

1. Stages of sugar cookery, crystalline and non-crystalline candies- Fondant, fudge, marshmallow.
2. Preparation of foam and effect of additives on stability, Meringue.
3. Effect of heat on milk / scum formation. Preparation of any 3 products.
4. Changes in pigments due to different cooking methods.
5. Market survey on new processed items available in the local markets

Individual experimentation

Determination of

1. Gluten content
2. Total reducing sugar
3. Acidity
4. Moisture
5. Percentage of total solids
6. Protein in milk
7. Moisture
8. Total ash
9. Acid insoluble ash
10. Crude fibre
11. Alcoholic acidity
12. Moisture in fats and oils
13. Fat in milk

Advances in Diet Therapy - II

Course Objectives

The Course aims

- To apprehend the etiology, symptoms and complications of diseases.
- To enable the student to recommend and provide appropriate nutritional care for prevention and treatment of the various diseases.
- To gain efficacy in principles of diet therapy for metabolic and degenerative diseases.

Unit I

Dietary management of Cardio Vascular Diseases

- a) Prevalence, Etiology, Risk Factors, Clinical diagnostic tests and nutrition management for - Dyslipidemias, Atherosclerosis, Angina Pectoris and Myocardial Infarction (MI) and Congestive Cardiac Failure (CCF)
- c) Prevention through life style modifications
- d) Dietary management - Low fat, low cholesterol and medium chain triglyceride diet

Dietary management of Hypertension

Definition, Classification and Causes, Signs & Symptoms and Complications, Dietary management - Diet related factors influencing hypertension, DASH diet - Lifestyle modification

Unit II

Dietary management of Upper Gastro Intestinal Diseases

Etiology, signs & symptoms complications and Dietary management for - Gastritis, Peptic ulcer, Dyspepsia, Esophagitis and Dumping Syndrome.

Dietary management of Lower Gastro Intestinal Diseases

Etiology, signs & symptoms and complications Dietary management for Flatulence, Diarrhea, Dysentery, Constipation, Celiac disease, Steatorrhea, Tropical sprue, Irritable bowel syndrome, diverticular disease, colon cancer, Ulcerative colitis and Crohn's Disease.

Unit III

Dietary management of Liver disease

a) Physiology, functions of the liver and liver function tests, Metabolic consequences of alcohol consumption, Etiology, Symptoms and Complications Dietary management for Hepatitis, Cirrhosis and Hepatic coma.

Dietary management of Gall Bladder Diseases

Physiology and functions of Gall Bladder, Gall bladder function tests, Dietary management for - Cholecystitis, Cholelithiasis, Acute Cholangitis and Cholestasis

Dietary management of Pancreatic Disorders

Physiology and functions of exocrine Pancreas, Pancreatic function tests, Dietary management for - Pancreatitis (Acute and chronic) and Zollinger- Ellison Syndrome

Unit IV

Dietary management of Diabetes mellitus

Prevalence, Types, Aetiology and Signs and Symptoms, Factors affecting normal blood glucose levels, impaired glucose homeostasis, Diagnostic test for diabetes, Complications of diabetes - macro-vascular and micro-vascular **Management of Diabetes**

Food exchange list, Glycaemic index of foods, Carbohydrate counting and resistant starch, Sweeteners and sugar substitutes, Meal planning approaches - With and without Insulin and

during sickness. Medications - Oral hypoglycaemic drugs and Insulin. Lifestyle modification and exercise to manage diabetes mellitus.

Management of Hypoglycaemia- Types, symptoms and fasting state hypoglycemia, Postprandial or reactive hypoglycemia, Dietary treatment in reactive hypoglycemia.

Unit V

Dietary management of Kidney Diseases

Physiology & functions of kidney, Kidney function tests. Aetiology, clinical signs & symptoms of kidney diseases - Glomerulonephritis, Nephrotic Syndrome, Acute Renal Failure (ARF), Chronic Renal Failure (CRF), End Stage Renal Disease (ESRD)-Dialysis and Kidney Transplant.

Nephrolithiasis/Renal Calculi- Aetiology, Types of stones and nutritional care- acid and alkaline ash diet.

Use of sodium, potassium and phosphorus exchange lists in diet planning of kidney diseases patient.

References

- Antia F.P. And Philip Abraham-Clinical Nutrition and Dietetics, 2001, Oxford Publishing Company.
- Swaminathan S- Advanced Textbook On Food & Nutrition, 2015, Bappa 26
- B. Srilakshmi- Dietetics, 2019, 8th Edn, New Age International Pvt. Ltd. New Delhi.
Reference Books:
 - Mahan L.K., Sylvia Escott-Stump - Krause's Food Nutrition and Diet Therapy 10th Edition, 2001, W.B. Saunders Company London.
 - Passmore P. And M.A. East Wood - Human Nutrition and Dietetics, Churchill Living Stone.
 - Raheena M. Begum - A Text Book of Foods Nutrition and Dietetics, 3 edition 2009, Sterling Publishers Pvt. Ltd
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 - Bennion M.: Clinical Nutrition, John Wiley & Sons.
 - Whitney, E. N. and C. B. Cataldo, Understanding Normal and Clinical Nutrition, 1983, West Pub.
 - Williams S. R. Essentials of Nutrition and Diet Therapy, 4th edn, 1986, Mosby College Pub. S. Louis.

COMPUTER APPLICATION IN NUTRITIONAL RESEARCH

Unit I

Introduction

Introduction to computer, characteristics of computer, Types of computer: Analog, Digital, Hybrid, Optical. Classification of Digital Computer – Micro, Mini, Mainframe, Super Computer. History of Computer: dark Age, Modern age. Generation of Computer. Anatomy of Digital Computer: Functions and components of computer, Memory, How CPU and Memory works. Input devices, Output Devices, Storage Devices

Unit II

MSDOS, MS Word, MS Excel, MS Power Point.

MS-DOS :- dir., copy, rename, delete files - make and remove directory MS-WINDOWS 95- Explore-File-New folder-Edit-Cut-Copy-Paste-View by name, by type.

MS-WORD: - MS-WORD-Menu bar-file-new-open-close-save-print-print view-page set up-margin settings

EDIT: cut, copy, paste, select all-FIND-find and replace, Go to page.

VIEW: tool bar, standard formatting-drawing-tables and borders.

INSERT: page number-Date & Time-picture-text box-object

FORMAT: font-paragraph-bullets and numbering-boarders and shading-tabs

TABLE: Insert table-cells and rows delete-merge-split-sort-formula-sum above, window left and right.

MS EXCEL: - Edit Menu, View Menu, Format Menu and Tools Menu.

MS POWER POINT – Slides – format – transition background-slideshow.

Unit III

Creating Forms and Reports

Queries - Creating a query in design view, working with design, creating different types of queries in wizard, using queries to calculate values and summarising the data. Forms - Creating a form in design view and wizard, modifying on existing form, creating a subform. Reports - Creating a report in design view and in wizard, creating a summary report, modifying an existing report, calculating values in a report, grouping report records, creating a subreport, creating mailing labels. Adding and deleting controls to forms and reports, beautifying forms and Reports - formatting text, adding lines, shapes, borders, pictures / images and clip art, setting image, alignment.

Unit IV

Multimedia

Multimedia Introduction: Multimedia- meaning Hardware, Components of a Multimedia system, Multimedia Elements; Text and Graphics.

Multimedia Elements: Sound, Animation and View, issues and trends in Multimedia.

International Media; e-mail, Internet, Teleconferencing, videoconferencing.

Computer Programming

Programming Basics - Visual Basic data types, variables - naming and declaring variables, types, constants, operators - Arithmetic, Relational and logical operators, Handling keyboard and Mouse Input in programs. Arrays-Declaring arrays, static array, Dynamic array, multi-dimensional array and control array. Modules - Form module, standard module, class module working with sub procedures and function procedures, Built-in functions.

Unit V

Introduction to Visual Basics

Introduction to Visual Basic-Introduction to development environment, forms-setting form properties, form events and methods, common intrinsic controls - setting properties for controls, events and methods for controls, adding controls to forms, dialog boxes - Input Box, Message Box, Common dialog boxes. Advanced Active X controls - Tree view and List view control Rich Text Box control, Ms Flex Grid control.

HUMAN FACTORS AND ERGONOMICS

UNIT- I

Introduction to Ergonomics

Definition, History and evolution. Scope of Ergonomics in home and other occupations, Nature of work in household and other occupations. Human Body and Work: Physiology of Neuro-muscular function in relation to occupational ergonomics; Physiological factors in muscle work; Physical work capacity; Energy requirement for muscular work; Energy expenditure for different activities; Endurance and muscular strength.

UNIT- II

Job Analysis

Significance of job analysis for occupational ergonomics, Fundamental elements of job analysis. Anthropometry in relation to occupational ergonomics. Postures-Definition and Scope

UNIT- III

Application of Ergonomic Principles in:

Tool Evaluation and Design; Work Station Evaluation and Design; Maintenance of Postures. Identifying types of postures assumed during work, analysis and interpretation

UNIT- IV

Use of instruments employed in ergonomic research.

Physiological tools for testing and monitoring -Blood pressure, Heart rate at rest, work and recovery period. Exercise ergometry- Cycle ergometer, treadmill

UNIT- V

Cardio-respiratory fitness

Anthropometric measurements and Physical Fitness Index. Body composition - body fat % , Body surface area, lean body mass by skinfold method and Somatotyping. Maximum aerobic capacity using modified Harvard test (Queens college test)
Determination of workload using heart rate and oxygen consumption- Treadmill, step stool

- i. Heart rate and oxygen consumption.
- ii. Pulse rate
- iii. Time and motion study.
- iv.

- v. Physiological cost.
- vi. Energy cost.
- vii. Cardiac cost

Assessment of Physical work capacity (PWC)

References:-

- (1) Astrand P .O. and Rodahl K. : Textbook of Work Physiology , McGraw Hill, New York.
- (2) Davies D.R. and Shingleton V .J. : Physiology of work, Motunen & Co. Ltd.
- (3) Osborne David : Ergonomics at work, John Wiley and sons, New York.
- (4) Dul Jan and Weidmeyer Bernard : Ergonomics for Beginners, Taylor and Francis, London.
- (5) Wilson J.R. and Corlett N. : Evaluation of Human Work. A Practical Ergonomics Methodology . Taylor and Francis, London.
- (6) Pheasant Stephan : Body space, Anthropometry , Ergonomics and the Designs at work, Taylor & Francis, London.

FOOD PROCESSING

Unit: 1

FOOD INDUSTRY AND FOOD PROCESSING

Magnitude, Division and Interdependent activities of the food industry, unit operations of the food industry. Food processing sector –vision and mission, opportunities, strategies and constraints in the Indian food processing sector.

Post-harvest priority requirements, Strengths, weakness, opportunities and threats (SWOT) of food sector

Unit: 2

RICE TECHNOLOGY

Rice Technology - Production, processing, milling of rice, parboiling, processes, by products of rice milling and their utilization. Nutrient loss during processing.

Wheat Technology - Production, processing, manufacture of breakfast cereals Millets - Production, processing.

Unit: 3

PROCESSING OF PULSES AND OIL SEEDS

Pulses - Production, types of processing of different pulse products - Soyabean Processing. Technology of oil seeds - Processing, meal concentrates and isolates. Rice bran oil, membrane processing of vegetable oils, vanaspathi with low Trans fatty acids, bakery fats with low Trans fatty acids, low-fat spreads, hydrogenation of fats.

Unit: 4

PROCESSING OF ANIMAL FOODS

Mushroom - Production, processing, utilization. Meat - Production, processing, smoking and curing of meat, grading.

Poultry - Production, preparing poultry for consumption, packaging

. Fish - Production, effect of handling practices, storage of eggs, manufacturing and packaging of egg products.

Retort processing of Ready to Eat (RTE) products. Preparation of masala powders, essence and honey based product

Unit: 5

PROCESSING OF VEGETABLES AND FRUITS

Vegetables - Drying and dehydration techniques –drum drying, vacuum puffing, foam mat drying, freeze drying, accelerated freeze drying. Processing of potato grits, potato granules, Potato flour, dehydrated garlic and dehydrated greenpeas.

Fruits- Sun drying of banana and grapes; Mechanical dehydration – use of kiln drier and tunnel drier. Canning -steps, spoilage of canned foods, advantages, disadvantages. Bottling – steps, advantages, disadvantages.

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FIELD WORK

Advances in Diet Therapy- II

1. Planning and preparation of diet for Cardio vascular disease patients – Atherosclerosis, Acute myocardial Infarction, Hypertension and Hypercholesterolemia
2. Planning and preparation of diets for - Gastro Intestinal Disorders-Peptic Ulcer, Constipation, Diarrhoea, Lactose intolerance, Celiac Disease, IBS and IBD
3. Planning and preparation of diets for the liver and pancreatic disorders - Hepatitis, cirrhosis, hepatic encephalopathy, gall stones and pancreatitis.
4. Planning and preparation of diets for the individuals with Diabetes mellitus - Type I diabetes, Type II diabetes and gestational diabetes. Prepare few sweets using artificial sweeteners.
5. Planning and preparation of diet for renal disorders- Glomerulonephritis, Nephrosis, acute renal failure, chronic renal failure, dialysis and renal calculi

COMPUTER APPLICATION IN NUTRITIONAL RESEARCH

1. Creation of document in MSWord
2. Creation of Excel sheets under varioustopics
3. Creation of various Power Pointpresentation
4. Creating folders, Cutting and pasting files into it .Deletingfiles
5. Giving experience ininternet
6. Creating a nutrition related database in Access and in VisualBasic
7. Applying different types ofqueries
8. Creating a form for patient details for any onedisease
9. Creating simple software innutrition.
10. Creating of invitation, greetings and menucards.

REFERENCE

1. Rajaraman.1984. Principles of Computer Programming. Prentice Hall of India, New Delhi.
2. Sankaranarayanan, M. Computer programming. Fortran 77 MS-OFFICE 97-MS WORD-MS-EXCEL and MS POWER POINT Manual Published by Microsoft coy,USA.

BIOCHEMICAL CHANGES IN DISEASES

Objectives:

- Understand the biochemical physiological impairments in diseases.
- Develop skills to analyze selected constituents in blood and urine during diseases.

UNIT: I

Biophysics

Principles involved in estimating Colorimeter, Chromatography, Flame photometry, Ion selective electrodes, Radioimmunoassay, ELISA test.

UNIT: II

Disorders of Carbohydrate Metabolism

- a) Disorders associated with hyperglycemia and hypoglycemia.
- b) Biochemical changes in diabetes mellitus and obesity.
- c) Inborn errors of carbohydrate metabolism.

UNIT: III

Disorders of Lipid Metabolism

- a) Serum total cholesterol, triglyceride and lipoproteins, phospholipids, glycolipids.
- b) Plasma lipids in various diseases – hypertension, hypolipidemia and ketosis.
- c) Factors associated with development of heart diseases.
- d) Biochemical changes in Atherosclerosis and Fatty liver.
- e) Inborn errors of fat metabolism.

UNIT: IV

Disorders of Protein Metabolism

- a) Clinical significance of protein concentration in blood.
- b) Cerebrospinal fluid and other body fluids – Urine, Lymph, Synovial fluid, Pleural fluid, Transudate and Exudates.
- c) Nitrogen metabolism with recommended readings to urea, uric acid, creatinine, creatine.
- d) Inborn errors of protein metabolism.

UNIT: V

Haematology and Body Electrolytes

- a) Hematology – Physical and biochemical changes in AIDS, Cancer and different types of Anaemia and Haemophilia.
- b) Body Electrolytes- Law of electron neutrality, maintenance of pH, buffer system in the body, regulation of acid base balance, role of sodium, potassium and chlorine.

RECOMMENDED READINGS

1. Gowen lock, AH, varleys practical Biochemistry, CBC publishers, New Delhi,1980.
2. Williams, DI and Vincent, R, Biochemistry in Clinical Practice1990.
3. Zubey, Biochemistry, III Edison MC Brown communication,1993.
4. Mukergee, K.L, Medical Laboratory Technology, Tata MaGraw HillPublishing Company, Co-Ltd, New Delhi.
5. Chatergee, M.N and Shinde R, Textbook of Medical Biochemistry, Jay PeeBrothers Medical Publishing Pvt Ltd, NewDelhi.
6. Lehninger A.L, Nelson D.C and Cox M.M, Principles of Biochemistry,CBS Publishers and distributors, Jain Bhavan, BhalaNatuNager.
7. Oser B.I, Hawkes, Physiological Chemistry, XIV Tata Mac Graw HillPublishing CorporationLimited.
8. Jayaram J, Laboratory manual in Biochemistry, New age internationalLtd. Publishers, New Delhi.

SPORTS NUTRITION

Unit 1

Sports physiology: Classification and physiology of field and court sports -Type and characteristics of team sports- field and court sports -Physique, physiology, body composition and energy metabolism in team sports.

Unit 2

Body Composition and Weight Management in Sports Body build, size and body composition, levels of body composition, methods to measure body composition- Fluid and electrolyte requirements- Hydration strategies in athletes based on rules of the sport, available time and opportunities to hydrate on the field.

Unit 3

Exercise Performance and Nutrition Energy expenditure during physical activity, Carbohydrates and performance, Fat metabolism and performance, Effect of exercise on protein requirements, Vitamins and Minerals, Fluid and electrolyte loss and replacement in exercise

Unit 4

Nutrition in Sports Nutritional requirements in Sports events-Team, Power and Endurance events, Pre-game and Post game regime. Carbohydrate loading, Water and electrolyte balance.

Unit 5

Macronutrient and Micronutrient needs of team sport athletes according to training and position on the field. -Carbohydrate intake- pre, during and post event/training. -Proteins and amino acids- type, amount and timing of ingestion -Fat requirements. Micronutrient requirements of team sport athletes- Role of vitamins and minerals in energy metabolism, blood formation, bone health, and antioxidants.

References:

1. Bamji S.M., Rao NP and Reddy V (1998). Text book of Human Nutrition. Oxford and IBH Publishing Co. New Delhi.
2. Fink H.H., Mikesky E.A and Burgoon A.L. (2012). Practical Applications in Sports Nutrition. 3rd ed. Jones and Barlett Learning, USA.
3. Gibney J.M. Macdonald A.I and Roche M.H (2003). Nutrition and Metabolism. Blackwell Publishing.
4. Maurice B Shils, Moshe Shike, A, Catherine Ross, Benjamin Cabellero, Robert J Cousins. 2006. Modern Nutrition in Health and Disease edited by Lippincott Williams and Wilkins.

RESEARCH METHODOLOGY

Objectives

1. Understand the methodology of research and techniques
2. Develop skills in conducting research from planning a study to reportWriting
3. Apply statistical procedure to analyse numerical data drawinferences

Unit I

Methods of Research

- a) Definition of research, characteristics of research, criteria of good research, Merits and demerits of scientific research, Different types of research and characteristics:
 - i. Historical research, Ex-post facto research, laboratory experiments, Field experiments, survey research, evaluative research, Case study research, operational research, participatory research
 - ii. Steps in conducting research
 - iii. Hypothesis: Definition, purpose, types
 - iv. Reporting: Methods of reporting, Technical reports
 - v. Research Abstract: Definition, guidelines for writing abstract
 - vi. Thesis: Definition, parts, steps in writing thesis

Unit II

Sampling Design

- a) Census and sample survey- Steps in sampling design, Sample size and its determination, Types of sampling: Random Sampling, Simple random sampling, Stratified random sampling, Systematic sampling, Cluster sampling, Non random sampling methods:
 - i. Judgements sampling
 - ii. Convenience sampling, quota sampling
 - iii. Benefits of sampling
 - iv. Sampling errors
 - v. Non sampling errors

Unit III

Methods of Data Collection and Classification

Methods of collecting primary data: Questionnaire, Interview, Schedule, Observation, Inventories, Checklists, Scaling techniques, Drafting of questionnaire, training of interviewers, Criteria for evaluation of instruments – reliability and validity, Sources of secondary data, precautions in the use of secondary data, Classification of data: types of classification, Formation of discrete and continuous probability distributions,

Tabulation of data: parts of a table, general rules of tabulation, types of tables, Diagrammatic representation of data, Graphic representation of data.

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Unit IV

Statistical Methods

Measures of central tendency: mean, median and mode, their relative advantages and disadvantages, Measures of dispersion: Mean deviation, standard deviation, Coefficient of variation, percentile, Types of correlation, coefficient of correlation and its interpretation-

Rank correlation, Regression equations and predictions, Analysis of variance, Contingency tables, Chi-square test, 't' test: student's 't' test, paired 't' test, unpaired 't' test, 'F' test

Unit V

Sampling Statistics and Introduction to Statistical Package for Social Sciences (SPSS)

Statistical inference and central limit theorem, Null hypothesis and tests of significance, chi-square. Testing difference between mean, proportions, standard deviations and correlations. Introduction to Statistical Package for Social Sciences (SPSS)

Food Safety and Sanitation

Course Objectives

The Course aims

- To enable students understand how food safety and sanitation practices prevent foodborne illness in food establishments.
- To emphasise the role of governmental and non-governmental organizations in governing food safety and sanitation.
- To familiarize on management of critical situations

Unit I

Food Safety and Sanitation Management

Introduction to food safety, Changing trends in food consumption and choices, The food flow, A new approach to an old problem, Facility planning and design, The role of government in food safety, The role of the food industry in food safety, Food protection manager certification, Recent initiatives in food safety.

Unit II

Factors that affect food borne illness

Time and temperature abuse- measure food temperatures, calibration of thermometer, measuring food temperature, Preventing temperature abuse, Methods to maintain temperature of food, Importance of good personal hygiene, Cross contamination, Other sources of contamination, Work area sanitation

Unit III

Cleaning and sanitizing operations

Principles of cleaning and sanitizing, Removal of food particles, Application of cleaning agents, Methods of cleaning, Commonly used cleaners and detergents, Frequency of cleaning, Sanitizing principles, Types of sanitizing- heat and chemical sanitizing, Factors affecting sanitizing, Chemicals used for sanitizing- chlorine, iodine, quaternary ammonium compounds. Equipment and supplies used for cleaning- mechanical dishwashing, manual dishwashing, cleaning fixed equipment.

Unit IV

Environmental sanitation and maintenance

Condition of the establishment- proper water supply and sewage disposal systems, Condition of building- infrastructure, facilities, maintenance and sanitation, Plumbing hazards in food establishments- cross connection, back flow: methods and devices to prevent back flow, grease traps, Garbage and refuse sanitation- inside and outside storage, Pest control- pests,

signs of infestation and Integrated Pest Management (IPM).

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Unit V

Accident prevention and crisis management

Safety in food establishment, Common types of injuries, Self-inspection safety checks, Facilities for emergency, Crisis management- bioterrorism, water supply emergency procedures, Foodborne illness incident or outbreak.

BIOCHEMICAL CHANGES IN DISEASES

INDIVIDUAL EXPERIMENTS

ANALYSIS OF BLOOD

Glucose

Haemoglobin

Total Cholesterol

Lipoprotein factors

Serum A/C ratio and total protein

Serum phospholipids

Serum Vitamin - A

Serum alkaline phosphatase

Serum Glutamate Oxaloacetate transaminase

Serum glutamate pyruvate

Serum Bilirubin

II. ANALYSIS OF URINE

Creatinine

Urea

Total nitrogen - albumin

Calcium

Phosphorus

Vitamin C

III DEMONSTRATION EXPERIMENTS

Analysis of food for

Dietary fiber

Sodium

Potassium

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Internship Training in hospitals (one month)

FUNCTIONAL FOODS AND NUTRACEUTICALS

Objectives

1. Gain knowledge about functional foods and nutraceuticals
2. Have thorough understanding about the health effects
3. Be familiar with applications in industry.

Unit I

Nutraceuticals

Nutraceuticals- Introduction, Definition, history, Nutraceuticals - The link between nutrition and medicine, classification – Dietary supplements, Functional foods, Historical perspective, scope & future prospects.

Unit II

Functional Foods

Functional Foods: Definition. Applications of herbs to functional foods. Nutritive and Non-nutritive food components,

Functional components and health effects of

- a) Soya, Olive oil, green tea, grape seed, wheat grass, garceniacambojia, Bee pollen, Caffeine, Lecithin, Mushroom extract, aloe Vera, Common beans, Capsicum annum, Mustards, Ginseng, Garlic, Grape, Citrus fruits, Fish oils and Sea foods. Functional foods from wheat and rice and their health effects
- b) Sports drink, Infant formula as functional foods.
- c) Bioavailability and safety issues of functional foods

Unit III

Phytochemicals and Other Food Components with Potential Health Benefits

Definition, sources, and bioavailability, effects on human health and potential applications in risk reduction of diseases –

- a. Polyphenols: Flavonoids, catechins, isoflavones, tannins, Phytoestrogens, Phytosterols, Glucosinolates Glycosides Alkaloids, Terpenoids
- b. Pigments : Lycopene, betacarotene, Curcumin etc, Organosulphur compounds
- c. Other components – Phytates, Protease inhibitors, saponins, Amylase inhibitors, haemagglutinins.

Unit IV

Role of Nutraceuticals in Disease

a. Food as remedies: Nutraceuticals in treatment for cognitive decline, Nutraceutical remedies for common disorders like Arthritis, Bronchitis, circulatory problems, hypoglycemia, Nephrological disorders, Liver disorders, Osteoporosis, Psoriasis and Ulcers Cardiovascular diseases, Cancer, Diabetes, Cholesterol management, Obesity, Immune enhancement and Endurance performance.

b. Role of nuts in cardiovascular disease prevention.

c. Role of Dietary fibers in disease prevention

Unit V

General idea about role of Probiotics and Prebiotics as nutraceuticals.

- a) Dietary supplements- - GMPS and shelf life of dietary supplements.
- b) Sources of micro algal health supplements
- c) Role of changing food preferences and globalization on selection of nutraceutical products
- d) Nutrigenomics - An introduction and its relation to nutraceuticals

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2. Yurawecz, M.P., M.M. Mossoba, J.K.G. Kramer, M.W. Pariza and G.J. Nelson eds (1999) Advances in Conjugated Linoleic Acid Research, Vol. 1. AOCS Press, Champaign.
3. Wildman, R.E.C.ed. (2000) Handbook of Nutraceuticals and Functional Foods, CRC Press, Boca Raton.
4. Fuller, R. ed. (1992) Probiotics the scientific basis, London: Chapman and Hall, New York.
5. Fuller, R.ed. (1997) Probiotics Applications and Practical Aspects, London: Chapman and Hall, New York.
6. Salminen, S. A. Von Wright (eds) (1998): Lactic acid bacteria: microbiology and functional aspects, 2nd edition, Marcell Dekker Inc. New York.
7. Goldberg, I. Ed (1994): Functional Foods: Designer Foods, Pharma Foods, Nutraceuticals, Chapman and Hall, New York.
8. Wood, B.J.B. ed. (1992): The lactic acid bacteria in health and disease, Elsevier Applied Science, London.
9. Gibson, G., Williams, C. eds (2000): Functional Foods. Woodhead Publishing Ltd. U.K.
10. Young, J. (1996): Functional Foods: Strategies for successful product development Management Report Pearson Professional Publishers, London.

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11. Frei, B. (1994): Natural antioxidants in human health and disease. Academic Press, San Diego.
12. Tannock, G.W. (1999): Probiotics: A critical review, Horizon Scientific Press.

FOOD MICROBIOLOGY

Objectives

1. Understand the common organisms associated with food borne illness.
2. Provide knowledge of microorganisms associated with food spoilage and foodborne diseases
3. Determine the presence, growth and survival of microorganism in food

Unit:1

Different Terminology, Food Spoilage & Prevention

Different terminology – Heterotrophic nutrition, autotrophic nutrition, saprophytic, holozoic, host, culture, parasite. General principles underlying spoilage-causes for spoilage, factors affecting kinds and number of microorganisms in food. Prevention and control of spoilage. Food poisoning, and food borne diseases.

Unit:2

Morphology of Bacteria, Mold, Yeast and Algae

Bacteria and Mold- Nomenclature, genera of bacteria and mold, morphology, growth curve, importance in food microbiology. Observation of motility of bacteria in milk, demonstration of mold growth in bread. Yeast - Morphology, classification, importance of yeast in food. Observation of yeast cells. Algae – Morphology and importance of algae.

Unit:3

Contamination of Cereals , Fruits and Vegetables and Fleshy Foods

Contamination and kinds of microorganisms causing spoilage of cereal products grains, flour, baked products and cake. Fruits and vegetables and their products- fruit juice, pickles. Fleshy foods - meats, poultry and fish.

Unit:4

Contamination of Egg, Milk & Milk Product, Beverages, Fats and Oils

Contamination and kinds of microorganisms causing spoilage of eggs, milk and milk products cream, milk frozen desserts and butter. Fats and oils, bottled beverages, spices and condiments.

Unit:5

Microorganisms in Water

Micro-organisms in Water - sources, bacteriological examinations, total count, test of E.Coli, purification of water, water borne diseases. Microorganisms in sewage and sewage disposal Destruction of bacteria- sterilization, physical agents, light, desiccators, electricity, heat and chemical agents. Importance of sanitation and hygiene in relation with spreading of microorganisms.

Reference

1. Frazier, W.C. and Westhof, D.C., Food Microbiology, Tata MC Graw Hill Publishing Company Limited,1993.
2. Johns, N Managing Food Hygiene, McMillan press Ltd.,1995.
3. Longree, K., Quantity Food sanitation, Inter Science Publishers, New York,1955.
4. Joshua, A., Microbiology, Popular book depot publishers, New York,1995.
5. Adams, M.R., Moss, M.O., Food Microbiology, New Age International (P)Limited Publishers,1996.
6. Rodey, S., Hygiene and Sanitation in food Industry, Tata McGraw Hill Publishing Company Limited, New Delhi, 1999.
7. Kumar, H.D, Kumar, S., Modern concepts of Microbiology, Vikas publishingHouse Pvt. Limited,1999.

NUTRITION FOR FITNESS and Health

OBJECTIVES:

1. To introduce the fundamental concepts of physical education, health and fitness.
2. To provide a general understanding on nutrition, first aid and stress management.
3. To familiarize the students regarding yoga and other activities for developing fitness.

UNIT- I

Concept of Physical Education and Health Definition, Aims and Objectives of Physical Education Importance and Scope of Physical Education Modern concept of Health, Physical fitness and Wellness

UNIT-II

Components of Physical Fitness Physical fitness components - Speed, Strength, Endurance, Flexibility and Coordinative Abilities Types of Physical Fitness - Health related Physical Fitness - Performance Related Physical Fitness - Cosmetic fitness Fitness Balance. Principles of Exercise Programme Activities for developing Physical Fitness Components Exercise and Heart rate Zones Principles of First Aid Nutritional Balance

UNIT-III

Yoga- Meaning, Aims and objectives, significance, Systems of Yoga - Eight limbs of yoga. Classification, difference between physical exercise and yogic exercise. Guidelines for practicing Asanas. Meditation - Meaning, types, role

UNIT-IV

Yoga and Stress Management Asanas and its effects - Padmasana - Halasana – Bhujangasana Shalabhasana - Dhanurasana - Shavasana - Vajrasana - Chakrasana - Trikonasana - Padahasthasana Postural Deformities – Corrective measures Stress Management and Relaxation Techniques

UNIT-V

Fundamentals of aerobics, Nutrition guidance on balanced eating and nutritional advice to clients for obesity, skin nourishment, hair treatment. Fruit and vegetables - Electrical treatment, machinery and technology - figure analysis - recommended treatment eg : muscle toning, fat elimination, relaxation and detoxification. Health Related Physical Fitness Test

REFERENCES

1. B.K.S. Iyengar, Light on yoga, London University, in paper back, 1989.
2. Yogeshwar, Text Book of Yoga, Madras Yoga Centre.
3. K. Chandrasekaran, "Sound health through Yoga" PremKalyan Publication, Sedapatti, 1999

FUNCTIONAL FOODS AND NUTRACEUTICALS

1. Demonstration of beta Carotene using Spectrophotometry.
2. Determination of Lycopene in Fruits and Vegetables.
3. Determination of Vitamin C in Fruits and Vegetables
4. Determination of alkaloids in Fruits and Vegetables
5. Determination of crude fibre in Fruits and Vegetables
6. Determination of saponin in Fruits and Vegetables
7. Estimation of tannin in Fruits and Vegetables
8. Determination of terpenoid in Fruits and Vegetables
9. Determination of flavonoid in Fruits and Vegetables
10. Determination of phenol in Fruits and Vegetables
11. Identification of various nutraceuticals and functional foods available in the market
12. Preparation and evaluation of dietary fibre rich functional foods
13. Preparation and evaluation of lycopene rich juices
14. Preparation and evaluation of probiotic and prebiotic foods
15. Preparation and evaluation of soy protein rich foods
16. Preparation and evaluation of herbal foods

FOOD MICROBIOLOGY AND SANITATION

1. Demonstration of cleaning and preparation of glassware
2. Demonstration of sterilization of glassware and media
3. Preparation of culture media
4. Visit to water plant to observe methods of purification and methods of sewage treatment.
5. Microbial examination of fruits, fleshy foods – surface washing.
6. Microbial examination of pure culture of bacteria by various methods (streak plate, spread plate, and pour plate)
7. Determination of quality of milk.
8. Identify types of microorganisms in cereal and cereal products.
9. Microscopic measurement of microbes using haemocytometer for surface washed vegetables, fruits and fleshy foods.

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Field Work

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PROJECT