

*DETAILED SYLLABUS*

*FOR*

*DISTANCE EDUCATION*

POST GRADUATE PROGRAM

**M.SC. IN FOOD AND NUTRITION**

SEMESTER SYSTEM

**COURSE TITLE** : M.Sc. IN FOOD AND NUTRITION  
**DURATION** : 2 YEAR  
**MODE** : SEMESTER  
**TOTAL MARKS** : 700

FIRST SEMESTER

<b>COURSE TITLE</b>	<b>Paper Code</b>	<b>MARKS</b>				<b>TOTAL MARKS</b>
		<b>THEORY</b>		<b>PRACTICAL</b>		
		<b>INTERNAL</b>	<b>EXTERNAL</b>	<b>INTERNAL</b>	<b>EXTERNAL</b>	
<b>ADVANCED PHYSIOLOGY</b>	<b>MSCFN/S/110</b>	40	60			100
<b>ADVANCED FOOD SCIENCE</b>	<b>MSCFN/S/120</b>	40	60			100
<b>ESSENTIALS OF MACRO NUTRIENTS</b>	<b>MSCFN/S/130</b>	40	60			100
<b>HEALTH AND FITNESS</b>	<b>MSCFN/S/140</b>	40	60			100

**Paper-1**

**Paper Code- MSCFN/S/110**

**ADVANCED PHYSIOLOGY**

**UNIT-I**

Cellular basis of Physiology - Body fluid compartment, membrane potential, Inter cellular communication - Homeostasis. Biochemical aspects of muscle tissue - structure, chemical composition, mechanism and energetics of muscle contraction, muscle fatigue. Biochemical aspects of nerve tissue - structure, composition & functions of nerve tissue. Special senses - only physiology of sense organs.

**UNIT-II**

Endocrinology and Reproduction Anatomy of endocrine glands and Reproductive organs. Hormones - Mode of action, functions of hormones of the endocrine glands - Pituitary,

Adrenal, M.Sc. Foods and Nutrition: Syllabus (CBCS)Thyroid, Gonadal hormones, Pancreas, Pineal body and Parathyroid, Hypo and Hyperfunctions of the glands.

### **UNIT-III**

Respiration and Gastro - Intestinal Oxygen requirement for nutrients, composition of inspired and expired gas, partial pressure of gas, diffusion gradient and gas flow, transport of oxygen and CO<sub>2</sub>, Hemoglobin affinity for O<sub>2</sub> and dissociation. Anatomy and function of Gastrointestinal Tract, movement of intestine. Mechanism of secretion of gastric juice.Hunger, Appetite, Satiety - physiological and psychological factors affecting food intake, circadian rhythm in GI tract secretions.

### **UNIT-IV**

Circulation and Excretion Blood - composition, functions of formed elements of blood and plasma proteins, origin and conduction heart beat, ECG-interpretation, Latest development in cardiac condition, cardio vascular mechanism and homeostasis.Excretion - formation of urine, characteristics of urine, normal and abnormal constituents of urine, acid - base balance.

### **UNIT-V**

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

## **Paper-2**

**MSCFN/S/120**

### **ADVANCED FOOD SCIENCE**

#### **UNIT-I**

Food Groups Cereals - Rice & wheat and other Millets - Composition and Nutritive Value.Starch - Sources, Characteristics, 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 cakes - Role of ingredients & preparation.

#### **UNIT-II**

Pulses - Composition, types, Cooking methods, factors affecting cooking quality, nutritive value, toxic constituents and its removal, Germination and factors affecting Germination .Vegetables - Structure, Classification, Composition, Methods of Cooking, Changes on Cooking - pigments, Nutritive value.Fruits - Structure, Classification, Composition, Ripening of fruits, changes on ripening, Pectic substances, Cooking changes.

### **UNIT-III**

Egg - Structure, Composition, Nutritive value, Grading, Methods of Cooking and Role of egg in cookery. Meat - Structure, Composition, Nutritive value, Classes and Grades of meat cuts, Changes on cooking and Rigor mortis. Poultry - Composition, Nutritive value, Grades, Methods of cooking, Effects of 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, Tests for rancidity, Hydrogenation, Changes in fat during heating, Factors affecting fat absorption, Shortening, Use of fat in tenderness of cooked products.

### **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 beverages. Spices and Condiments - Uses and abuses.

## **Paper-3**

**MSCFN/S/130**

### **ESSENTIALS OF MACRO NUTRIENTS**

#### **UNIT-I : CARBOHYDRATES**

History, classification, sources, functions, digestion, absorption, utilization and storage, hormonal regulation of blood glucose, role of carbohydrate in dental caries. Dietary fiber - Development and concept, role of fiber in lipid metabolism, colon function, blood glucose level and GI tract functions - Disadvantages of Dietary fibre.

#### **UNIT-II : LIPIDS**

History, 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 the diet.

#### **UNIT-III : PROTEINS AND AMINOACIDS**

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

#### **UNIT-IV : ENERGY**

History, 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.

#### **UNIT-V**

Inter relationship between carbohydrate, fat and protein, nutritional adaptation and hypotheses.

### **Paper-4**

**MSCFN/S/140**

## **HEALTH AND FITNESS**

#### **UNIT-I**

Definition of Health and wellness - Factors affecting health and wellness. Physiological, psychological and social health.

#### **UNIT-II**

Fitness - Definition, basic components of physically active life style in preventing obesity, osteoporosis, heart disease, and diabetes, Physical fitness tests - for flexibility, muscle endurance (any 3 tests for each) and cardio vascular endurance.

#### **UNIT-III**

Nutrition and exercise - energy requirement for, aerobic and anaerobic exercises, carbohydrate loading, water and dehydration, special foods. Importance of exercise in preventing life style diseases - Diabetes, CVD, hypertension, obesity and osteoporosis.

#### **UNIT-IV**

Sports nutrition - special foods - Nutrition and performance of athletes and players, dietary modifications and diet plan, sports supplementation.

#### **UNIT-V**

Special nutritional needs for monitoring, space, military and sea voyage.

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SECOND SEMESTER

<b>COURSE TITLE</b>	<b>Paper Code</b>	<b>MARKS</b>				
		<b>THEORY</b>		<b>PRACTICAL</b>		<b>TOTAL MARKS</b>
		<b>INTERNAL</b>	<b>EXTERNAL</b>	<b>INTERNAL</b>	<b>EXTERNAL</b>	
<b>ESSENTIALS OF MICRO NUTRIENTS</b>	<b>MSCFN/S/210</b>	40	60			100
<b>NUTRITION THROUGH LIFE CYCLE</b>	<b>MSCFN/S/220</b>	40	60			100
<b>FOOD MICROBIOLOGY</b>	<b>MSCFN/S/230</b>	40	60			100
<b>HUMAN RIGHTS</b>	<b>MSCFN/S/240</b>	40	60			100

**Paper-1**

**Paper Code- MSCFN/S/210**

**ESSENTIALS OF MICRO NUTRIENTS**

**UNIT-I : HOMEOSTASIS MAINTENANCE**

Water - Distribution of water in the body, role of water, Water balance, Fluid balance  
 .Electrolytes - Electrolyte content of fluid compartments, Functions of electrolyte, Sodium, Potassium and Chloride, Absorption, Transport and balance, Factors affective electrolyte balance and hydrogen ion balance.

**UNIT-II : FAT SOLUBLE 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-III : 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 fat soluble vitamins with other nutrients.

### **UNIT-IV : 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, Sources, Calcium: Phosphorus ratio. Iron - Distribution, Concentration in the body, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Sources, RDA, interaction with other nutrients, Role of iron in prevention of anaemia.

### **UNIT-V : MICRO MINERALS**

Iodine, Fluoride, Mg, Cu, Zn, Se, Manganese, Chromium, Distribution in the human body, Physiology, Function, deficiency, Toxicity and Sources.

## **Paper-2**

**MSCFN/S/220**

### **NUTRITION THROUGH LIFE CYCLE**

#### **UNIT-I**

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 in Pregnancy Stages of gestation, maternal weight gain, complications of pregnancy, maternal physiological adjustments, nutritional problems and dietary management, importance of nutrition during and prior to pregnancy, teenage pregnancy - nutritional problems and dietary management, planning a menu.

#### **UNIT-III**

Nutrition during Lactation Physiology of lactation, hormonal control and reflex action, efficiency of milk production, problems of breast feeding, nutritional composition of breast milk, nutritional concerns during lactation, special foods during lactation, dietary



modification, planning a menu. 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 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 problems, planning a menu.

#### **UNIT-V**

Nutrition in Adult and Elderly Nutrition and work efficiency, Menopausal and post menopausal women, hormonal changes, nutritional requirement, planning a menu. Physiological changes in aging - Psycho-social and economical factors affecting eating behaviour, social situation, knowledge and belief, institutionalization, common health problems, nutritional requirement, modification in diet, feeding old people.

### **Paper-3**

**MSCFN/S/230**

### **FOOD MICROBIOLOGY**

#### **UNIT-I**

Classification of microorganism, morphology of yeast, mould, bacteria, virus, algae and protozoa.

#### **UNIT-II**

General principles underlying spoilage of food, fitness and unfitness of food for consumption, contamination and spoilage of non perishable and perishable foods.

#### **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, 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.

**Paper-4**

**MSCFN/S/240**

**HUMAN RIGHTS**

**UNIT-I**

Definition of Human Rights - Nature, Content, Legitimacy and Priority - Theories on Human Rights - Historical Development of Human Rights.

**UNIT-II**

International Human Rights - Prescription and Enforcement upto World War II - Human Rights and the U.N.O. - Universal Declaration of Human Rights - International Covenant on Civil and Political Rights - International Covenant on Economic, Social and Cultural Rights and Optional Protocol.

**UNIT-III**

Human Rights Declarations - U.N. Human Rights Declarations - U.N. Human Commissioner.

**UNIT-IV**

Amnesty International - Human Rights and Helsinki Process - Regional Developments - European Human Rights System - African Human Rights System - International Human Rights in Domestic courts.

**UNIT-V**

Contemporary Issues on Human Rights: Children's Rights - Women's Rights - Dalit's Rights - Bonded Labour and Wages - Refugees - Capital Punishment. Fundamental Rights in the Indian Constitution - Directive Principles of State Policy - Fundamental Duties - National Human Rights Commission.

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THIRD SEMESTER

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		<b>THEORY</b>		<b>PRACTICAL</b>		<b>TOTAL MARKS</b>
		<b>INTERNAL</b>	<b>EXTERNAL</b>	<b>INTERNAL</b>	<b>EXTERNAL</b>	
<b>NUTRITIONAL BIOCHEMISTRY</b>	<b>MSCFN/S/310</b>	40	60			100
<b>DIET THERAPY</b>	<b>MSCFN/S/320</b>	40	60			100
<b>COMMUNITY NUTRITION</b>	<b>MSCFN/S/330</b>	40	60			100
<b>NUTRITION IN EMERGENCIES</b>	<b>MSCFN/S/340</b>	40	60			100

**Paper-1**

**Paper Code- MSCFN/S/310**

**NUTRITIONAL BIOCHEMISTRY**

**UNIT-I : BIOLOGICAL OXIDATION**

Enzymes and co-enzymes involved in oxidation and reduction, respiratory chain, phosphates in biologic oxidation and energy capture, role of respiratory chain and mechanism of phosphorylation.

**UNIT-II : METABOLISM Of CARBOHYDRATE**

Glycolysis, Gluconeogenesis, TCA cycle, HMP shunt, bioenergetics, disorders of carbohydrate metabolism - galactosemia, glycogen storage disease, pentosuria, abnormal level in blood glucose.

**UNIT-III : METABOLISM Of LIPIDS**

Biosynthesis and oxidation of saturated and unsaturated fatty acids, glycerides, phospholipids and cholesterol, bioenergetics, disorders of lipid metabolism, lipoproteins and their significance.

#### **UNIT-IV : PROTEIN And AMINOACID METABOLISM**

Biosynthesis of protein, general catabolism of aminoacids, deamination, transamination, urea cycle, disorders of aminoacid metabolism - phenyl ketonuria, cystinuria, albinism, alkaptonuria, maple syrup disease.

#### **UNIT-V : METABOLISM OF NUCLEIC ACIDS**

Biosynthesis of purine and pyrimidine nucleotides, DNA replication and repair, biochemical importance of cyclic AMP. Disorders of purine and pyrimidine metabolism - gout, aciduria, xanthinuria. Structure and properties of DNA, RNA -mRNA, tRNA, rRNA.

### **Paper-2**

**MSCFN/S/320**

### **DIET THERAPY**

#### **UNIT-I**

Principle of Nutritional care, Types of hospital diets. Nutrition Support Techniques, Enteral feeding - indications, Types - Nasogastric, Gastrostomy, Jejunostomy and Rectal feeding - requirements and advantages. Parenteral feeding - Nutritional Support, Formula feeds and Complications in TPN.

#### **UNIT-II**

Diet in Febrile condition Short duration - Typhoid, Influenza, Malaria, Long duration Tuberculosis. Diet in deficiency diseases - PEM, Vitamin A, Anaemia Surgery -Physiological response, Metabolic Consequences, Stage of Convalescence, pre and post operative diets. Burns - Metabolic changes in protein and electrolytes and Nutritional support. Diet in Energy Imbalance - Underweight and obesity, Etiology and dietary management. Diet in allergy - Common food allergens, test for allergy - Skin test and Elimination diet and Treatment for allergy.

#### **UNIT-III**

Diseases of cardio vascular system - Risk factors of CVD, Etiology, Symptoms, and dietary management of atherosclerosis, Ischemic heart disease, dislipidemia, prevention through life style modifications. Hypertension - Classification, prevalence, Diet related factors influencing hypertension, Management of hypertension.

#### **UNIT-IV**

Diseases of the Gastro intestinal system- Disorders, Etiology, Symptoms and dietary management of Acute gastritis, Chronic gastritis, Peptic ulcer - duodenal & gastric Intestinal disease - Flatulence, Diarrhoea and Dysentery, Constipation, Celiac disease, Tropical sprue, Irritable bowel syndrome, diverticular disease, colon cancer, Ulcerative colitis. Liver disease - Hepatitis, cirrhosis, Jaundice, fatty liver, cholecystitis and cholelithiasis, Hepatic coma. Pancreas - Pancreatitis, Acute and chronic Diabetes Mellitus - Etiology, Types, Symptoms, Diagnosis, metabolic alterations, complications and treatment.

#### **UNIT-V**

Diseases of the Kidney - Etiology, Symptoms and Dietary modification, Nephritis, Nephrosis, Acute and chronic renal failure, Nephrolithiasis, Transplantation and dialysis, Dietary Modification. Dietary modification and Nutritional Support for cancer and HIV.

### **Paper-3**

**MSCFN/S/330**

## **COMMUNITY NUTRITION**

#### **UNIT-I**

Definition and brief study of community, family, village and block. Malnutrition - causes, ecological factors, effects of malnutrition, protein deficiency diseases - PEM, Kwashiorkor - incidence, prevalence, epidemiology. The package programmes of immunization, nutrition education, feeding programmes, and measures to overcome malnutrition. Vitamin deficiency - A, B1, B2, Niacin, C, D - prevalence, programmes to combat. Nutritional Anaemia - Prevalence, programmes to control. IDD and fluorosis - Prevalence, causes, symptoms and programmes to control.

#### **UNIT-II**

Assessing the food and nutrition problems in the community - socio economic diet survey, anthropometry, clinical examination, laboratory examination for common nutrition problems.

#### **UNIT-III**

Nutrition and National Development, National nutritional policy - Aim, objectives, guidelines and thrust areas. PDS - Public distribution system, Agricultural planning - New strategies.

#### **UNIT-IV**

Nutrition intervention Programmes - Objectives, operation of feeding programmes. ICDS, TINP, NNMS, IRDP, DWACRA. National organizations - ICMR, NIN, NNMB, ICAR, CFTRI, NIPCCD. International organizations - FAO, WHO, UNICEF, UNESCO, World Bank.

## **UNIT-V**

Demographic changes due to malnutrition. IMR, MMR, Mortality, morbidity rate, birth rate, sex ratio, poverty level. Nutrition education - Merits, planning, evaluation and conduct. Health care delivery - PHC, School Health services and their role in preventing communicable diseases.

## **Paper-4**

**MSCFN/S/340**

## **NUTRITION IN EMERGENCIES**

### **UNIT-I**

Natural / manmade disasters resulting in emergency situations. Famine, drought, flood, earthquake, cyclone, war, civil and political emergencies. Factors giving rise to emergency situation in these disasters. Illustration using case studies from Indian Subcontinent.

### **UNIT-II**

Nutritional problems in emergencies in vulnerable groups. Causes of malnutrition in emergency situations. Major deficiency diseases in emergencies. Protein – energy malnutrition. Specific deficiencies.

### **UNIT-III**

Communicable diseases: Surveillance and treatment. Control of communicable diseases in emergencies. Role of immunisation and sanitation.

### **UNIT-IV**

Assessment and surveillance of nutritional status in emergency affected populations. Scope of assessment of malnutrition in emergencies. Indicators of malnutrition clinical signs for screening acute malnutrition. Anthropometric assessment of nutritional status – Indicators and cut – offs indicating seriously abnormal nutrition situation weight – for – height based indicators, MUAC, social indicators. Organization of nutritional surveillances and individual screening.

### **UNIT-V**

Public nutrition approach to tackle nutritional problems in emergencies.

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FOURTH SEMESTER

<b>COURSE TITLE</b>	<b>Paper Code</b>	<b>MARKS</b>				
		<b>THEORY</b>		<b>PRACTICAL</b>		<b>TOTAL MARKS</b>
		<b>INTERNAL</b>	<b>EXTERNAL</b>	<b>INTERNAL</b>	<b>EXTERNAL</b>	
<b>RESEARCH METHODOLOGY AND APPLIED STATISTICS</b>	<b>MSCFN/S/410</b>	40	60			100
<b>FOOD BIOTECHNOLOGY</b>	<b>MSCFN/S/420</b>	40	60			100
<b>NUTRACEUTICALS</b>	<b>MSCFN/S/430</b>	40	60			100
<b>PROJECT</b>	<b>MSCFN/S/440</b>	40	60			100

**Paper-1**

**Paper Code- MSCFN/S/410**

**RESEARCH METHODOLOGY AND APPLIED STATISTICS**

**UNIT-I**

Meaning of research, Types of research, Objectives of research. Collection of Data - Methods of collecting data. Primary and Secondary data - Sources of Primary and Secondary data, Editing the data and precautions used in the use of data. Different types of research tools for collecting research data, defining and determining a problem.

**UNIT-II**

Sampling Design - Census and sampling survey, Methods of sampling - Probability and non-probability sampling methods size of the sample, Merits & Demerits of each sampling method, Sampling errors and methods of Reducing the error.

### **UNIT-III**

Classification and Tabulation of Data - Meaning, Objective, Types of Classification, Formation of frequency distribution, Tabulation of data - Schemes general rules, Types of tables and preparation of tabular forms. Representation of data - Diagrammatic and Graphic significance, Types of diagrams, Types of graphs.

### **UNIT-IV**

Measures of central tendency - Mean, Median, Mode, their relative advantages and disadvantages. Measures of dispersion - mean deviation, standard deviation, Quartile deviation, Co-efficient of variation, percentile, Association of attributes, Contingency table, correlation - coefficient of correlation and its interpretation, Rank correlation, Regression equation and predictions.

### **UNIT-V**

Probability - Theorems, Simple Problems, Distributions - Binomial Poisson distribution, normal distribution, their properties and simple problems. Testing of significance - Large and Small sample tests - 't' test, Chi square test, and 'F' test - simple problems. Writing a research report - format of thesis writing with eg.

## **Paper-2**

**MSCFN/S/420**

### **FOOD BIOTECHNOLOGY**

#### **UNIT-I**

Biotechnology - Definition, Scope , Application. Gene cloning - Definition, Basic concepts, Characteristics of ideal cloning vector, Plasmid, Bacteriophages, Cosmid and Phasmid Eg. PBR 322.

#### **UNIT-II**

Fermentation Technology - Definition, Steps in fermentation, Design of bio reactors, Medium & Micro organism. Microbial products - Primary, secondary metabolites, Vit B12, Citric Acid, Penicillin & alcohol.

#### **UNIT-III**

Enzyme Technology - Production of enzymes - Amylase, Protease, Lipase, Lactase and pectinase, Use of enzymes in food & beverage industry (eg Cheese, fruit, juice, Wine, Meat tenderizing & dairy)

#### **UNIT-IV**

Plant tissue culture - Basic requirement for tissue culture Lab, Media & Techniques

(Basics only)Animal cell culture - Primary culture cell line, media requirement & application (only outline)

#### **UNIT-V**

Biotechnology & Health care Vaccines - Types, Biogas & Bio ethanol production, Concept of Bio - remediation, Hazards of genetic engineering.

### **Paper-3**

**MSCFN/S/430**

## **NUTRACEUTICALS**

#### **UNIT-I**

Introduction - Definition, history, classification - Type of classification (Probiotics, Probiotics and Synbiotics; Nutrient Vs Non-Nutrient: according to target organ, according to source of origin)

#### **UNIT-II**

Probiotics Taxonomy and important features of probiotic micro-organisms.Health effects of probiotics including mechanism of action.Probiotics in various foods: fermented milk products, non-milk products etc.Quality assurance of probiotics and safety.

#### **UNIT-III**

Prebiotics Definition, Chemistry, Sources, metabolism and bioavailability, effect of processing, Physiological effects, effects on human health and potential applications in risk reduction of diseases, Perspective for food applications for the following.Non-digestible CHO / Oligosaccharides.Dietary fibre, resistant starch, gums.

#### **UNIT-IV**

Other Food components with potential health benefits:Polyphenols: Flavonoids,Catechins is flavones tanning.Phytoestrogens Phytosterols Glucosinolates Pigments: Lycopene, Curcumin etc.Organo Sulphur Compounds Other Components - Phytates, Protease inhibitions, saponins, amylase inhibitions, haemagglutinins.Active biodynamic principles, in spices, condiments and other plant materials.

#### **UNIT-V**

Non-nutrient effect of specific nutrients:Proteins, peptides and nucleotides, conjugated linoleic acid and n-3 fatty acids, vitamins and minerals.

### **PROJECT WORK**

### **Paper-4**

**MSCFN/S/440**