Kanya Mahavidyalaya, Kharkhauda

Scheme of examination and curriculum contents

of

Master of Vocational (Food Science and Nutrition)

I.PROGRAMME EDUCATIONAL OBJECTIVES (PEOS):

The overall objectives of the Learning Outcomes-based Curriculum Framework (LOCF) for Master of Vocational (Food Science and Nutrition) are:

PEO1. To impart the basic knowledge of food science, health and related areas of studies

PEO2. To impart knowledge of microbiology, nutrition requirements for people of different age groups.

PEO3. To impart knowledge regarding management of nutritional deficiencies to lifestyle disorders

PEO4. To familiarize them with importance of nutrition during various stages of life

PEO5. To develop the learner into competent and efficient nutrition expert

PEO6. To empower learners by communication, professional and life skills

PEO7. To imbibe the culture of research, innovation and entrepreneurship

PEO8. To inculcate professional ethics, values of Indian and global culture

II. PROGRAMME LEARNING OUTCOMES (PLOS):

The key outcomes of Master of Vocational (Food Science and Nutrition) are as follows:

After completing this post graduate programme the learner:

PLO1. Shall acquire fundamental knowledge of food science, health and related areas of studies

PLO2. Shall acquire the knowledge of the nutritional value of foods and food products consumed by humans.

PLO3. Shall be competent and efficient working professionals for imparting better nutritional sanitation & hygiene practices to individuals, community and food industry.

PLO4. Shall be able to enhance the ability of leadership skills

PLO5. Shall become socially responsible citizen with global vision

PLO6. Shall have an understanding of learning throughout the life

PLO7. Shall have professional ethics and value of Indian and global food culture

PLO8. Shall have the primary research skills

III. Credit Matrix for Master of Vocational (Food Science and Nutrition)

	Semester 1	**Semester2**	**Semester3**	**Semester 4**	**Total**
Core Paper	20	12	8	8	48
Elective (Discipline Specific)	-	4	8	-	12
Foundation Course	-	2	-	-	2
Open Elective	-	3	3	-	6
Lab Courses	8	8	8	-	24
Experiential Learning*				-	
Innovational Learning*	-		-	-	
Mid Semester Training	-	-	2	-	2
End Semester Training Training and Training Report Presentation in Seminar Maintenance of Log Book	-	-	-	 15 5 2	22
Total	28	29	29	30	116

***These will be qualifying in nature based upon the satisfactory performance of the student**

Scheme of Examination

M.VOC FOOD SCIENCE AND NUTRITION

(W.E.F. ACADEMIC SESSION 2021-2022)

SEMESTER -1						
Paper No	**Nomenclature of paper**	**Credits**	**Hrs**	**Max. Marks**	**Internal Assessment**	**Total Marks**
CORE PAPERS						
21MVOCFSNC1	Principles of Food Science	4	4	80	20	100
21MVOCFSNC2	Food Chemistry	4	4	80	20	100
21MVOCFSNC3	Food Microbiology	4	4	80	20	100
21MVOCFSNC4	Nutritional Biochemistry	4	4	80	20	100
21MVOCFSNC5	Human Physiology	4	4	80	20	100
EXPERIENTIAL LEARNING						
21MVOCFSNEL1	*Industrial/ Hospital visit to minimum three industries (Report to be presented in seminar/workshop		-	-		
LAB COURSES						
Lab Course I (21MVOCFSNL1)	(MVOCFSNC1, MVOCFSNC2 and MVOCFSNC3)	4	8	-	-	100
Lab Course II (21MVOCFSNL2)	(MVOCFSNC4 and MVOCFSNC5)	4	8	-	-	100
Total Credits = 28						700

SEMESTER - 2						
Paper No	**Nomenclature of paper**	**Credits**	**Hrs**	**Max Marks**	**Internal Assessment**	**Total Marks**
CORE PAPERS						
21MVOCFSNC6	Fundamentals of Nutrition & Dietetics	4	4	80	20	100
21MVOCFSNC7	Processing of Plant Based Foods	4	4	80	20	100
21MVOCFSNC8	Community Nutrition	4	4	80	20	100
DISCIPLINE SPECIFIC (ELECTIVE) 1 (ANY ONE) (OFF-LINE MODE)						
21MVOCFSND1	Specialty Nutrition	4	4	80	20	100
21MVOCFSND2	Nutrition During Life Cycle	4	4	80	20	100
OPEN ELECTIVE						
	One paper to be opted by students from pool of paper	3	3	80	20	100
FOUNDATION ELECTIVE PAPER						
	One paper to be opted by students from pool of paper	2	2	40	10	50
EXPERIENTIAL LEARNING						
21MVOCFSNE2	*Visit to three Community Nutrition centre/UNICEF Nutrition Camp/Mid-Day Meal Unit/CDS Unit (Report to be presented in seminar/workshop)		-	-		
INNOVATIONAL LEARNING						
21MVOCFSNIL1	Nutrition Care Process of Sports Person In Minimum Three sports			Grading system A, B,C		

LAB COURSES						
Lab Course III (21MVOCFSNL3)	(MVOCFSNC6/ MVOCFSNC7, MVOCFSNC8)	4	8			100
Lab Course IV (21MVOCFSNL4)	MVOCFSND1/ MVOCFSND2	4	8			100
Total Credits =29						750

SEMESTER – 3						
Paper No	**Nomenclature of paper**	**Credits**	**Hrs**	**Max. Marks**	**Internal Assessment**	**Total Marks**
Core Papers (OFF-LINE MODE)						
22MVOCFSNC9	Therapeutic Nutrition	4	4	80	20	100
22MVOCFSNC10	Processing of Animal Based Foods	4	4	80	20	100
DISCIPLINE SPECIFIC (ELECTIVE) 2 (ANY ONE) (OFF-LINE MODE)						
22MVOCFSND3	Food Toxicology	4	4	80	20	100
22MVOCFSND4	Institutional Food Management & Marketing	4	4	80	20	100
DISCIPLINE SPECIFIC (ELECTIVE) 3 (ANY ONE) (OFF-LINE MODE)						
22MVOCFSND5	Nutraceuticals and Functional Foods	4	4	80	20	100
22MVOCFSND6	Food Safety and Quality Control	4	4	80	20	100
OPEN ELECTIVE (OFF-LINE MODE)						
	One paper to be opted by students from pool of paper	3	3	80	20	100
INDUSTRIAL TRAINING						

22MVOCFSN1	Minimum 4 weeks Industrial/ hospital training in summer vacation after 2nd semester (Report and viva-voce)	2			50	50
EXPERIENTIAL LEARNING						
22MVOCFSNEL3	*Visit to three health and fitness centres/Naturopathy unit/Nutraceuticals manufacturing unit (Report to be presented in seminar/workshop)		-	-		
LAB COURSES						
Lab Course V (22MVOCFSNL5)	MVOCFSNC9 and MVOCFSNC10	4	8	100		100
Lab Course VI (22MVOCFSNL6)	MVOCFSND4/MVOCFSND5 and MVOCFSND6/ MVOCFSND7	4	8	100		100
Total credits = 29						750

SEMESTER-4						
Paper No	**Nomenclature of paper**	**Credits**	**Hours**	**Max. Marks**	**Internal Assessment**	**Total Marks**
CORE PAPERS (ON-LINE MODE)						
22MVOCFSNC11	Food Packaging and Nutritional Labeling	4	4	80	20	100
22MVOCFSNC12	Entrepreneurship Development in Food Processing Industry	4	4	80	20	100
On the Job Industrial Training (Minimum Three Months)						

MVOCCSNT2	Training Report and viva-voce	15		100	100	200
MVOCFSNT3	Presentation in Seminar	5		100	100	200
MVOCFSNT4	Maintenance of Log Book	2			100	100

Total Credits: 30 Marks: 700

Note: Students have to undergo a minimum of 3 months of training in the food processing industry, hospitals, health clubs/centres, catering/hotel industry, nutrition counseling centres etc.

****These will be qualifying in nature based upon the satisfactory performance of the student**

- **Guidelines for students undergoing industrial training:**

As per the regulations of UGC the student should undergo industrial training/internship for a minimum period of three months during the fourth semester. Before proceeding on Industrial Training, students must seek instructions from the Principal or the Faculty, who is in-charge of Industrial Training.

- **Internship / industrial training**

Industrial Training refers to work experience that is relevant to professional development prior to graduation. Industrial Training is an essential component in the development of the practical and professional skills required for an Engineer and an aid to prospective employment. It should also be noted that developing an awareness of general workplace behavior and interpersonal skills are important objectives of the Industrial Training experience. At the end of the Industrial Training, students should be able to improve their knowledge and skills relevant to their areas of specialization and at the same time able to relate, apply and adapt relevant knowledge, concepts and theories within an industrial organization, practice and ethics. With this experience and exposure the students should be able to acquire knowledge and skills to compete in the job market.

- **Objectives of industrial training programme:**

The objectives of the Industrial Training include:

- To give students the opportunity to apply the knowledge and skills they have acquired on campus in a real-life work situation.
- To provide students with opportunities for practical, hands-on learning from practitioners in the

students' areas of specialization.

- To expose students to a work environment, common practices, employment opportunities and work ethics in their relevant field.

- To enhance the employability skills of the students.

- To provide opportunities for students to be offered jobs in the organizations in which they undergo their Industrial Training.

➢ **STUDENT**

The student is responsible to ensure that all matters relating to the Industrial Training Programme are conducted in an ethical, conscientious, trustworthy and committed manner.

(A) **Before Industrial Training**

(i) To apply for a suitable Industrial Training, submit an application form through the Officer (Training / Training and placement) to the organization concerned one semester before the Industrial Training Programme commences.

(ii) Submit one copy of the offer letter for the Industrial Training to the Head of the department or Faculty coordinator (Industrial Training). Students are not allowed to change their Industrial Training after obtaining the approval and confirmation from the Industry.

(iii) To complete the Industrial Training placement process within the specified time based on the Industrial Training Programme schedule.

(iv) To ensure that the Industrial Training is not performed in a family-owned company so as to avoid conflict of interest.

(B) **During Industrial Training**

(i) Once the student has reached the training place, he / she must send a mail to the Faculty coordinator (Industrial Training / Department) / Head of the department or Officer (Training / Training and placement) that he / she has joined the training from _____ in the industry (Name) _____ and forward his / her contact nos., E-mail ID and the contact nos. of the company representative.

(ii) During the training, students will be given 3-4 practical problems by the industry in which they are undergoing training. In case the industry does not give them the problems, the students will themselves formulate minimum three problems and maximum four problems and carry out detailed

study on them and recommend the optimum solution based on their theory knowledge.

(iii)To maintain discipline and abide by all rules and regulations enforced by the organization and to ensure FULL attendance during the Industrial Training duration.

(iv)To carry out the Industrial Training in an ethical and professional manner and to uphold the reputation of the institution at all times.

(v) To maintain confidentiality and to not disseminate / share any information related to the organization to third parties.

(vi)To be responsible for maintaining the security of properties belonging to the organization.

ASSESSMENT COMPONENTS

Assessment within the Industrial Training context aims to evaluate the student's work quality and appropriateness to the field of study with reference to the learning outcomes of the Industrial Training Programme. Students should be evaluated by the university/faculty coordinator (Industrial Training / Department). Evaluation methods used may consist of the following:

Industrial Training report

Presentation by the student

Preparation of Log Book by Students

DISCIPLINARY PROCEDURES DURING INDUSTRIAL TRAINING PROGRAMME

Within the training period, the student is wholly responsible to the organization where he or she has been placed. This means that the student must observe specified office hours, and must adhere to all rules and regulations of the organization, just like the other staff within the organization, during the entire training period.

DEPARTMENTAL REPORT

When the training of the student in a particular department / section / shop of an industry is completed, he / she should write a departmental report. Report should include a description of the department / Section / Shop, the processes and procedures followed in it. Individual items of equipment, special attachment, indigenously adopted tools should be described. Personnel & any other human resource features should be highlighted. Drawings, sketches, specification of equipment, used, should be given wherever essential. The report should also contain entire studies & discussions carried out by the

students in addition to what he / she has observed during his / her day to day work. The departmental report should be signed by the student and also by his officer-in-charge of that department / section / shop.

The report must include the following:

(a) The basic history/ introduction of the industry.
(b) The sequence of operations followed/ systems introduced for the production.
(c) The layout of various workshop/floors or the labs and admin section of the industry.
(d) The infrastructure available.
(e) The movement of material (raw, semi finished and finished product),
(f) The formulation of 3 to 4 practical problems.
(g) Data required formulating the problems.
(h) Suggestions made based on the analysis of the data.
(i) Recommendations.
(j) Certificate from the industry for the period of training undergone.

The final report must be at-least 25 to 30 pages for the student undergoing 90 days training. In case no. of students undergoing training in the same industry are more than one, each student will prepare his / her report separately.

FORMAT OF INDUSTRIAL TRAINING REPORT

The following titles must be incorporated in the final industrial training report:

1. Preface / Acknowledgement
2. Certificate with Signatures and Seal of the Industry Person
3. Contents/Index
4. Introduction about the Industry
5. Training Schedule
6. Work Done / Observations
7. Specific Assignment / Project Handled
8. Learning after Training
9. Summary

EVALUATION THROUGH SEMINAR PRESENTATION

The students will present his report through a seminar, which will be held by an expert committee constituted by the concerned department as per norms of the institute. The evaluation through seminar presentation will be based on the following criteria.

a) Quality Of Material Presented. b) Effectiveness of Presentation. c) Depth of Knowledge and Skills.

Upon completion of training programmes, students are expected to demonstrate the following graduates attributes:

Conceptual Knowledge

Problem analysis

Design/development of solutions

Conduct investigations of complex Nutrition problems and modern technique usage, The nutritionist and society Individual and Team Work

Communication and Project Management and Finance

PrinciplesofFood Science

(21MVOCFSNC1)

Maximum Marks: 80 **Time: 3 Hours.**

Note: -There will be nine questions in all. The first question comprising short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks.

After completion of the course student will be able:

CO1: To learn basic knowledge of basic principles of food science

CO2: To understand and learn basics of foods, food composition, nutritive value, functions and roles of foods in relation to human consumption.

CO3: To learn basic principles of food processing and preservation methods.

Unit I

Scope and importance of food science, basic concept of food: components, nutrients, classification of food, properties of food, food functions, relation of nutrition to good health, Energy: definition, calorific value of foods and its estimation.

Unit II

Food preservation and processing: Chemical preservation: types, uses and effects of class I and II preservatives in foods, household preservative methods: pickling, salt curing, oiling, sugar addition and smoking, principle and preservation by low temperature: refrigeration, chilling, freezing, lyophilisation; Drying, dehydration and concentration, brief concept of different heat processing methods: blanching, roasting, frying, baking and various cooking methods of foods

Unit III

Food additives- definitions, classification and functions, antioxidants,colours and flavours (synthetic and natural), emulsifiers, sequestrants, humectants,hydrocolloids, sweeteners, acidulants, buffering salts, anticaking agents, etc. - chemistry,food uses and functions in formulations

Unit IV

Basic concepts in unit operations in food processing - material handling, separating, cleaning, disintegrating, pumping, mixing, heat exchange, evaporation, drying, forming and packaging.

Basic concept of new food product development: Stages of product development and standardization, sensory evaluation of foods, packaging, labelling and marketing of new food products

Recommended Readings:

1. Mahindru, S N (2000) Food Additives- Characteristics Detection and Estimation. Tata McGraw Hill Publishing Co. Ltd.Coles R, McDowell D and Kirwan MJ, Food Packaging Technology, CRC Press, 2003
2. Potter NH, Food Science, CBS Publication, New Delhi, 1998
3. Ramaswamy H and Marcott M,Food Processing Principles and Applications CRC Press, 2006
4. Ranganna S, Handbook of Analysis and Quality Control for Fruits and Vegetable Products, 2nd ed. TMH Education Pvt. Ltd, 1986
5. Fellows, P. J. (2002*)* Food Processing Technology- Principles and Practices, 2nd Edition.Woodhead Publishing Ltd.
6. Fuller, G.W. (1999) New Food Product Development. From concept to market place.CRCpress, New York.
7. Murano P.S. (2003) Understanding Food Science and Technology, Thomson learning Inc., California.

Food Chemistry

(21MVOCFSNC2)

Maximum Marks: 80 **Time: 3 Hours**.

Note: - There will be nine questions in all. The first question comprising short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks

After completion of the course student will be able:

CO1: To know classifications and functions of carbohydrates in our body.

CO2: To learn about different types of minerals –absorption, sources, functions and deficiency

CO3: To know the classification, functions and metabolism of carbohydrates, amino acids, proteins and nucleic acids.

CO4: To understand the classification, sources and functions of lipids in our body.

Unit I

Food chemistry- definition, scope and importance; water in food, water activity and shelf life of food; chemistry and stability of water and fat soluble vitamins; minerals and their bioavailability, Food enrichment and fortification.

Unit II

Carbohydrates -classification, physical and chemical properties of sugars, functional properties and uses of pectic substances, gums and dietary fiber in food; browning reaction in food: enzymatic and non-enzymatic browning, their occurrence and applications in food; starches: functionality of starch in foods, gelatinization and retro-gradation of starches, modified starches, resistant starches.

Unit III

Lipids classification, Essential fatty acids, omega three and omega six fatty acids, properties- lipolysis, auto-oxidation, rancidity and flavour reversion, thermaldecomposition and effect of ionizing radiations; modification of fats and oils (hydrogenation and interesterification), fat mimetics.

Unit IV

Proteins : Classification and structures of protein and amino acids, physical, chemical and functionalproperties of proteins, functional properties of food proteins, modification of food protein

inprocessing and storage and its implications, texturized, denaturation of protein, gel formation, Enzymes: Nomenclature, specificity, structure, isolation and purification. Enzyme cofactor, Theory of Enzyme catalysis, Kinetics of Enzyme catalyzed reaction, Enzyme analysis, Enzyme utilization in food industries. Vitamins, Minerals and Co-factors.

Recommended Readings:

1. Meyer, L.H.(1998) Food Chemistry, Van Nostrand, Reinhold Company Publication,New york, London.
2. Alias C. and Lindeu G (1991) Food Biochemistry, Ellis Horwood, New York
3. Pomeranz, Y and Meloon, R. (1995) Food Analysis: Theory and Practice, Westport,An AVI Publication, New York, Sydney, Toronto.
4. Fennema, R.O (1997) Food Chemistry, Second Edition, Food Science &Technology series, Marcel Dekker, INC., New York
5. John M. deMan (2007). Principals of Food Chemistry, Springer India pvt Ltd, NewDelhi.
6. Tom Coultate (2016) Food The chemistry of its components, Published by RoyalSociety of Chemistry, Cambridge, UK

Food Microbiology

(21MVOCFSNC3)

Maximum Marks: 80 **Time: 3 Hours**.

Note: There will be nine questions in all. The first question comprising of short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks.

After completion of the course student will be able to:

CO1: To do classification and characteristics of microorganisms.

CO2: To understand in depth microbial growth.

CO3: To understand the details of pasteurization and sterilization.

CO4: To learn in depth microbial metabolism & Fermented food.

CO5: To do classification and characteristics of food borne diseases and poisoning.

Unit I

Introduction and general Morphology of micro-organisms, general characteristics of bacteria, yeast, fungi and mold. Control of micro-organisms, sources of micro-organisms in foods (air, soil, water and sewerage / contaminated water). Microbial growth, growth curve; factors affecting growth-intrinsic and extrinsic factors controlling growth of microorganisms.

Unit II

Foods microbiology and its importance in food handling, food poisoning, types of food poisonings, important features etc; bacterial agents of food borne illness, food poisoning by *Clostridium*, *salmonella*, E. coli, bacillus, staphylococcus etc. Food Borne Viral Pathogens (Norwalk virus, Norovirus, Reovirus, Rotavirus, Astrovirus, Adenovirus, Parvovirus, Hepatitis A Virus).

Unit III

Protection and preservation of Foods: Chemical, Modified atmosphere, Radiation in foods from the microbiological angle. Indicators of water and food safety and quality. Preservation by non thermalmethods; high pressure, pulsed electric field, hurdle technology. Effects of non thermal and thermal treatments on microorganisms.

Unit IV

Food spoilage: characteristic features, dynamics and significance of spoilage of different groups of foods - Cereal and cereal products, vegetables and fruits, meat poultry and sea foods, milk and milk products, packed and canned foods. Conventional and rapid detection methods for microorganism; ELISA, PCR, etc.

Recommended Readings:

1. James M. Jay (2000). Modern Food Microbiology, 5th Edition, CBS Publishers.
2. Banwart, G.J. (1997). Basic Food Microbiology, CBS Publishers.
3. Adam M.R. & Moss, M.O. (1995). Food Microbiology, New Age International Pvt. Ltd Publishers.
4. Bibek Ray (1996). Fundamental Food Microbiology, CRC Press.
5. Stanier, R.Y. (1996). General Microbiology, Vth Edition, MacMillan

Nutritional Biochemistry

(21MVOCFSNC4)

Maximum Marks: 80 **Time: 3 Hours**.

Note: There will be nine questions in all. The first question comprising short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks.

After completion of the course student will be able :

CO1: To understand the metabolism of various nutrients in human body

CO2: To understand the nutritional biochemistry of various food macro and micronutrients

CO3: To understand the etiology of various nutritional disorders

CO4: To understand the basic concept of nutritional metabolism and energy kinetics

Unit I

Basic concepts: Concept of balanced diet and energy content of foods;basal metabolic rate (BMR), determination of BMR, factors affecting BMR, specific dynamic action (SDA) and factors affecting them; Thermogenic effects of foods;Antinutrients:Protease inhibitors.

Unit II

Carbohydrates: Dietary requirements and sources of available and unavailable carbohydrates; Physico-chemical properties and physiological actions of unavailable carbohydrates (dietary fibers); Glycemic index and glycemic load. Metabolic pathways: Carbohydrates – Aerobic and anaerobic degradation, glycogenesis, glycogenolysis, gluconeogenesis,

Proteins: Nitrogen balance studies and factors influencing nitrogen balance, Biological value of protein (B.V), protein efficiency ratio (PER), Essential amino acids and concept of protein quality, Cereal proteins and their limiting amino acids.

UnitIII

Vitamins: Dietary sources, biochemical functions and specific deficiency diseases associated with fat and water soluble vitamins;Hypervitaminosis symptoms of fat-soluble vitamins.

Minerals: Nutritional significance of dietary calcium, phosphorus, magnesium, iron, iodine, zinc and copper.

Lipids- Metabolism of triacylglycerol, β oxidation of fatty acids, cholesterol. Regulation of lipid metabolism and ketone bodies.

UnitIV

Nutritional disorders: Etiology, clinical features, metabolic disorders and management of Marasmus and Kwashiorkor, Nutritional anemia - mechanism, etiology and clinical symptoms of vitamin B12, folateand iron deficiency anemia.

Recommended Readings:

1. Textbook of Medical Biochemistry By MN Chatterjea and Rana Shinde, Jaypee Brothers.
2. Essentials of Food and Nutrition Vol I & II, By M. Swaminathan. Bangalore Printing and Publishing Co. Ltd.
3. Modern Nutrition in Health and Diseases, By Maurice E Shils and Vernon Robert Young, 7th Ed., Pub: Lea &Febiger.
4. Handbook of Nutrition and Food 2ndEd., By Carolyn Berdanier, Johanna Dwyer and Elaine Feldman, CRC Press
5. Nutritional Biochemistry By Tom Brody. Academic Press.
6. Nutritional Biochemistry By S Ramakrishnan and S. Venkat Rao. TR Publications
7. Nutritional Biochemistry and Metabolism: With Clinical Applications By Maria C. Linder. Publisher: Appelton and Lange

Human Physiology

(21MVOCFSNC5)

Maximum Marks: 80 **Time: 3 Hours.**

Note: - There will be nine questions in all. The first question comprising short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks.

After completion of the course student will able:

CO1: To deliberate the details of cell structure and its functions.

CO2: To understand in detail different functions and role of nervous system and endocrine system, excretory system and reproduction system

CO3: To learn the details of the digestive system and respiratory system.

CO4: To know about excretory system and reproductive system in detail.

UnitI

Cell structure: General cell structure and its functions.

Nervous System: Review of structure and function of neuron - conduction of nerve impulse, synapses, and role of neurotransmitters - Organization of central and Peripheral nervous system. Hypothalamus and its role in various body functions-obesity, sleep, memory.

Unit II

Digestive system: Review of structure and function - Secretory, Digestive and Absorptive functions - Role of liver, pancreas and gall bladder and their dysfunction - Motility and hormones of GIT. Regulation of food intake – role of hunger and satiety centers, effect of nutrients.

Excretory system :Structure and function of nephron - Urine formation - Role of kidney in maintaining pH of blood -Water, electrolyte and acid base balance – diuretics.

Unit III

Circulatory and Cardio Vascular system: Blood - formation, composition, clotting and haemostasis .Formation and function of plasma proteins. Erythropoesis. Blood groups and histocompatibility. Blood indices - Use of blood for investigation and diagnosis of specific disorders, Structure and function of heart and blood vessels - Regulation of cardiac output and blood pressure, heart failure, hypertension. Respiratory system: Review of structure and function. Role of lungs in the exchange of gases. Transport of oxygen and Co2. Role of haemoglobin and buffer systems. Cardiorespiratory response to exercise and physiological effects of training.

Unit IV

Immune system: Cell mediated and humeral Immunity - Activation of WBC and production of antibodies. Role in inflammation and defense. Endocrine system :Endocrine glands (Pituitary gland, Thyroid, parathyroid, Islets of Langerhans, Adrenals, Ovary and Testis, Thymus, Pineal gland – structure, function, role of hormones, regulation of hormonal secretion, Disorders of endocrine glands Emphasis on physiology of diabetes and stress hormones.

Recommended Readings:

1. Human Physiology. VolI &II - C. C. Chatterjee, Medical Allied agencies
2. Ganong W.F. 1985: Review of Medical Physiology 2nd Edition, Lange Medical Publication.
3. Moan Camcell E.J. Dickinson C.J.. Edwares C.R.N. and Sikora K. (1984): Clinical Physiology, 5th Edition. Publication.
4. Guyton, A.C. and Hall, J.B. (1996) Text Book of Medical Physiology, 9th Edition, W. B. Saneers Company... Books Pvt. Ltd. Bangalore.
5. Wilson KTW and Waugh A (1998): Ress and Wilson Antony and Physiology in Health and 4th Edition
6. Mc.W.D. Karen F.J. and Katch, V.L. (1996): Exercise Physiology, Energy, performance, 4thEdition, Williams and Wilkons Batimere
7. Jain A.K. Text Book of Physiology, Vol I and II Avichal Publishing Co. New Delhi.

Fundamentals of Nutrition and Dietetics

(21MVOCFSNC6)

Maximum Marks: 80 **Time: 3 Hours.**

Note: - There will be nine questions in all. The first question comprising short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks.

After completing the course, the student will be able :

CO1. To understand the diet and its principles

CO2. To identify three routes used to deliver nutrients to clients and potential complications with these routes.

CO3. To discuss the kinds of commercial formulas available for oral and internal feeding

Unit I

Definition and scope of nutrition, different types of nutrition and nutrients, definition and history of dietetics, Role of dietitian as part of the medical team., diet planning, general principles of diet planning, concept of balanced diet and factors affecting balanced diet.

Unit II

Modification of Normal Diet and various nomenclatures of standard hospital diets, Hospital diet- Scope and importance, Routine hospital diets - Normal / General diets - Liquid diets and formula diets- Soft diets and bland diets. 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.

Unit III

Exercise Physiology: Concept of energy, work and power; Effect of exercise on muscular, nervous, cardiovascular and respiratory system; Energy metabolism; energy systems during exercise; Components of energy expenditure such as BMR, thermogenic effect of food and physical activity; Energy cost of exercise; Nutrition management during exercise.

Unit IV

Composition and Delivery methods of diet and its complications. Parenteral Nutrition Type of access, Parenteral nutrition solutions/composition.

Obesity: Definition, classification and biochemical basis; Genetic and environmental factors leading to

obesity; Obesity related diseases and management of obesity; metabolic changes in obesity; Role of leptin in regulation of body mass.

Recommended Readings:

1. Mahan L.K., Sylvia Escott-Stump (2000): Krauses "Food Nutrition and Diet Therapy 10th Edition, W.B. Saunders Company London.
2. B. Srilakshmi, (2007): Dietetics, published by K.K. Gupta For New Age International Pvt. Ltd. New Delhi.
3. Sue Rodwell Williams, (1993): Nutrition, Diet Therapy, (7th Ed) : W.B. Saunders Company London.
4. Antia F.P. And Philip Abraham (2001) Clinical Nutrition and Dietetics, Oxford Publishing Company.
5. Gopalan C., Ram Sastri B.V. And Bal Subramaniam S.C., (2006) Nutritive Value of Indian Foods, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research.
6. Passmore P. And M.A. East Wood: Human Nutrition And Dietetics, Churchill Living Stone.
7. WohlShils and Goodheart: Modern Nutrition In Health And Disease, McLAren And Ubrman, Philadelphia.
8. Robinson Ch., M.B. Lawlea, W.L., Chenoweth, and A.E., Carwick: Normal And Therapeutic Nutrition, Macmillan Publishing Company.

Processing of Plant Based Foods

(21MVOCFSNC7)

Maximum Marks: 80 **Time: 3 Hours.**

Note: - There will be nine questions in all. The first question comprising short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks.

After completion of the course student will be able:

CO1: To learn technology of milling of various cereals

CO2: To understand technical knowhow of pulses and oilseeds refining

CO3: To learn technology of milling of various cereals

CO4: To understand technical knowhow of pulses and oilseeds refining

Unit I

Cereals and Legumes: Cereals - classification and structure of cereals.

Milling Technology of wheat: Introduction, purpose of milling of Wheat, wheat milling systems, wheat flout types, grades and quality characteristics of wheat flour

Milling Technology of pulses: Milling of pulses, Dry milling, Wet milling, improved milling method

Milling technology of rice and corn: rice milling systems, rice grades and types, wet and dry milling of corn

Unit II

Wheat types, dough rheology and chemistry, quality of flour and flour treatment. Technology of various types of bakery products including bread, biscuits and cakes and other products like noodles

Composite flours: concept, importance and applications in bakery products

Unit III

Vegetables and Fruits: Vegetables- Classification of vegetables, post harvest changes and storage. Vegetable products processing: Dehydrated, canned, frozen, pickled and vinegar pickled vegetables. Vegetable juices, pastes and powders. Fruits-Classification, post harvest handling and storage of fruits. Fruit Products: Dried, canned, deep frozen, rum fruits, pulp, slurries, marmalades, jams and jellies, plum sauce, thickened fruit syrup, juices, nectars, concentrates and powder, Dehydration of fruits and vegetables: Sun drying & mechanical dehydration, process variation for fruits and vegetables, packing and storage.

Unit IV

Edible Fats and oils and Plantation crops: Edible Fats and oils- classification and Origin of individual fats and oils, production, processing of oils. Shortening-types and preparation. Mimic fats and fat powder. Plantation crops: Varieties, and processing of Tea, coffee and coco. Processing of spices-pepper, turmeric,cardamom, chilli, palm , vanilla and mustard.

Recommended Readings:

1. Kent, N.L. 2003. Technology of Cereal, 5th Ed. Pergamon Press.
2. Chakraverty. 1988. Post Harvest Technology of Cereals, Pulses and Oilseeds, revised Ed., Oxford & IBH Publishing Co. Pvt Ltd.
3. Marshall, Rice Science and Technology. 1994. Wadsworth Ed., Marcel Dekker, New York.
4. Manay, S. and Sharaswamy, M. 1987. Food Facts and Priniciples.Wiley Eastern Limited.

Community Nutrition

(21**MVOCFSNC8)**

Maximum Marks: 80 **Time: 3 Hours**.

Note:-There will be nine questions in all. The first question comprising short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks.

After completion of the course student will be able:

CO1. To identify and contribute to the prevention of public health/social health problems in the country

CO2. To have knowledge to treat common illnesses at home

CO3. To get acquainted with the various national and international level programmes launched for community nutrition

Unit I

Concept and Scope of Community Nutrition in India**;** Nutritional problems in India - Malnutrition, causes, symptoms, prevention and treatment; Nutrition Education: - Importance of nutrition education, Nutrition education methods: -lectures, Posters, Charts, online/blended mode for communityImpact of population structure and demographic transition. Awareness and educational system for community nutrition

Methods of assessment of nutritional status, Strategies to combat Nutritional problems; Concept of food enrichment and fortification.

UnitII

Prevalence of malnutrition in India: Common nutritional problems - causes and preventive measures - PEM, VAD, IDA, IDD, VDD, Obesity and fluorosis. Approaches and strategies for improving nutritional status and health – Intervention Programmes - Nutrition policy and programmes. Role of national and international organizations to combat malnutrition. Perspectives in food and nutrition security – basic concepts, production, distribution, access, availability, losses and consumption, food and nutrition security at national, household and individual levels. Food Security Programmes- Public Distribution System (PDS), Antyodaya Anna Yojana (AAY), Annapurna Scheme, Food for Work Programme.

Unit III

Nutritional surveillance system (NSS) - Objectives, initial assessment indicators for use in nutritional surveillance, Triple A approach. Role of agencies- national, international and voluntary; National and International agencies in community nutrition-Integrated Child Development Service(ICDS), School Nutrition Programme (SNP), World Health Organisation (WHO), United Nations Children Emergency Fund(UNICEF), National Institute of Nutrition (NIN), Central Food Technological Research (CFTRI). ICMR.

Unit IV

Assessment of nutritional status of individuals and population - Significance of nutritional assessment of community, methods for assessing nutritional status., Direct methods-Anthropometry, biochemical, clinical, dietary and functional methods of assessments. Indirect methods: demography, population dynamics and vital statistics.

Recommended Readings:

1. Park K., Preventive and social medicine, Bamarasidas Bahnot Publishers, Jabalpur.
2. Jellilfe D. B., Infant nutrition in tropics and subtropics, WHO, 1965.
3. Bamji M. S., Prahalad Raov, Reddy V, Text book on human nutrition, Oxford and IBM publishing co. Pvt. Ltd.
4. Proceeding of Nutrition Society of India, NIN.
5. Indian Council of Medical Research. Recommended Dietary intakes for Indians-Latest
6. Recommendations.P.K. Shukla, Nutritional problems of India, Prentice Hall, India.
7. Sabarwal B., Applied Nutrition and Health education, common wealth publishers, New Delhi.

Discipline Specific (Elective)-1

Specialty Nutrition

(21MVOCFSND1)

Maximum Marks: 80 **Time: 3 Hours.**

Note: -There will be nine questions in all. The first question comprising of short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks.

After completion of the course student will be able:

CO1: To understand the special nutritional requirements for physical activities relate to sports and exercise

CO2: To understand the nutritional requirements of extreme environment habitants

CO3: To know balanced diet management for lactating and pregnant mothers and space travelers

Unit I

Introduction to specialty nutrition: definition, importance of specialty nutrition, types of specialty in nutrition. Nutritional requirement for extreme environment: nutritional requirements in high altitude, nutritional requirements in cold and polar environment, nutritional requirements in hot environment. Nutritional support system in relief and rehabilitation. Surveillance of nutritional status in emergency relief situations such as flood, cyclone, earthquake, drought, war etc., Assessment of food needs, food distribution strategy, mass and supplementary feeding, special foods/ rations for nutritional relief, organizations for mass feeding/food distribution, transportation and storage, Feeding centers, sanitation and hygiene.

Unit II

Nutritional requirements during special considerations: obesity, multiple gestations, bariatric surgery and vegetarians.

Unit III

Sports nutrition: Introduction, evolution and growth of sports nutrition, need and scope of sports nutrition; Preparation for competition such as pregame meal, meal during game and post game meal; Concept of carbohydrate loading and the methods of carbohydrate loading; Nutrition management during sports/game; Ergogenic aids in sports

Energy substrate for activities of different intensity and duration, aerobic and anaerobic activities. Fluid balance in sports and exercise, importance, Dehydration its symptoms and prevention of dehydration, Sports drink, types of sports drinks.

Unit IV

Space nutrition: Introduction, changes in body composition under microgravity: muscle loss, oxidative stress, ophthalmic and immune changes, endocrine system function related to the nutritional status in the space flight, gastrointestinal and cardiovascular health during space missions, astronaut nutrition, space food system: the vegetable production system (VEGGIE), types and classification of space food, food preparation and selection.

Recommended Readings:

1. Bucci, L., 1993 Nutrients as Ergogenic Aids for Sports and Exercise. Boca Raton, FL.: CRC Press.
2. Advances in Sport and Exercise Science: Nutrition and Sport, Edited by Don MacLaren. Ch Published by Churchill Livingstone, Elsevier. 2007
3. Energy-Yielding Macronutrients and Energy Metabolism in Sports Nutrition. Edited by Judy A Driskell, Ira Wolinsky, CRC Press 2000.
4. Goyet Fish, V., Seaman, J. and Geijer, U. (2008): The Management of NutritionalEmergencies in Large Populations, World Health Organisation, Geneva.
5. Whitney, E.N. and Rolfes, S.R. (2003). Understanding Nutrition, 8th Edition, WestWadsworth, An International Thomson Publishing Co.
6. Young, H. and Jaspars, S. (1995). Nutrition matters: People, food and famine,Intermediate Technology Publications, London.

Discipline Specific Elective-1

Nutrition During Life Cycle

(21MOVCFSND2)

Maximum Marks: 80 **Time: 3 Hours.**

Note:-There will be nine questions in all. The first question comprising of short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks**.**

After completion of the course student will be able to:

CO1: learn basic principles of meal and menu planning for various age groups

CO2: prepare balanced diet chart as per nutritional requirement of lactating and pregnant mothers

CO3: understand how to finalize and prepare dietary requirements for special age group of people including infants, adolescents and old people

Unit I

Basic principles of meal and menu planning, Factors to be considered in meal/menu planning, Balanced diet, factors affecting balanced diet.

Unit II

Nutrient in Pregnancy and Lactation Nutritional status and general health, Physiological changes in pregnancy, foetal under nutrition and consequences ,Energy and calorie relationship in pregnancy weight gain ,Protein, vitamins and mineral nutrition in pregnancy ,Physiological adjustments during lactation,Diet of lactating women and nutritional requirements.

Unit III

Nutrition during infancy: Physiologic development, nutrient requirements composition of human milk and cows milk, Anti infective factors, formula preparation, weaning, supplementary and complementary feeding, growth monitoring, feeding and BW and premature infants.

Preschool and children; Growth and development during preschool, children, adolescent, nutritional requirements, factors influencing food intake, nutritional concerns – PEM, Anemia, Dental caries, obesity, anorexia and bulimia.

Unit IV

Nutrition requirements during **adolescence, adult**: Nutrition requirements during adolescent and adult age, physical activity and energy relationship, factors influencing food intake, nutritional concerns – Anemia, obesity, anorexia and bulimia .

Old age: Physical activity and energy relationship, theories of aging, physiologic changes, nutritional needs, nutrition concerns – dysphagia and senility disorders, community nutrition programme for old age.

Recommended Readings:

1. Mahan, L.K. and Escott-Stump, S. (2000) Krause's Food, Nutrition and Diet Therapy, 10th Ed.W.B.Saunders Company, London.
2. Williams S.R. (1993): Nutrition and Diet Therapy, 7th Ed. Times Mirror / Mosby College Publishing, St. Louis.
3. Antia F.P, Clinical Dietetics and Nutrition, Oxford University Press.
4. Shills, M.E, Oslon, J.A, Shike, M and Ross, A.C. (1999): Modern Nutrition in Health and Disease, 9th Edition. 5. Shubangini A Joshi, (1998): Nutrition and Dietetics, Tata Mc Graw Hill Pub. Co. Ltd., New Delhi.
5. National Institute of Nutrition, (2005): Dietary Guidelines for Indians – A Manual, Hyderabad.
6. Srilakshmi. B, (2005): Dietetics, V Edition, New Age International (P) Ltd, Publishers, Chennai.

Therapeutic Nutrition

(22MVOCFSNC9)

Maximum Marks: 80 **Time: 3 Hours.**

Note:-There will be nine questions in all. The first question comprising of short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks.

After completing this course, the student will be able:

CO1: To define and classify nutritional care for persons with diabetes mellitus

CO2: To learn dietary management of cardiovascular diseases

CO3: To learn dietary management in case of upper and lower gastrointestinal diseases

CO4: To know about dietary management in case of liver disease

CO5: To identify and learn major causes of acute and chronic kidney failure and nutritional care for the same

Unit I

Diet and Nutrition counseling: Role of dietician on hospitalized and outdoor patients and development of nutritional care plan. Specific functions of a therapeutic, administrative and consultant dietitian. Team approach in patient care. Psychological considerations in feeding the patients. Inter personal relationship with patients. Nutrition counseling- concept, components, activities for behavior changes, intervention counseling models, types of counseling session in patients.

Unit II

Therapeutic diets: Therapeutic adaptation of normal diets, principles and classification of therapeutic diets. Dietary management and treatment of fever and infections, Surgical conditions – Pre-Operative and Post Operative conditions, burns and trauma – complications and dietary treatment, allergy, Cancer and AIDS AND gastrointestinal disorders

Etiopathophysiology, metabolic and clinical aberrations, complications, prevention and recent advances in the medical nutritional management of Diabetes mellitus Renal disorders – Acute and chronic glomerular nephritis, Nephrotic syndrome, Renal stones, ESRD and Dialysis. Neurological disorders – Parkinsons, Epilepsy, Alzheimer's syndrome.

Unit III

Etiopathophysiology, metabolic and clinical aberrations, complications, prevention and recent advances in the medical nutritional management of Weight imbalances, Cardio vascular disorders – Atherosclerosis, Arteriosclerosis, Heart attack, Hypertension and Myocardial infraction.

Nutritional management of Musculo – skeletal disorders – Bone fractures, Osteoporosis, Arthritis and Rheumatic arthritis.

Unit IV

Food- Drug Interaction: Effect of Food on Drug Therapy. Effect of Drug on Food and Nutrition. Modification of Drug Action by Food and Nutrition. Effect of Drug on Nutritional Status. Excipients and Food-Drug Interaction. Medical nutritional therapy.

Recommended Readings:

1. Mahan L.K., Sylvia Escott-Stump (2000): Krause's Food Nutrition and Diet Therapy 10th Edition, W.B. Saunders Company London.
2. B. Srilakshmi, (2007): Dietetics, published by K.K. Gupta For New Age International Pvt. Ltd. New Delhi.
3. Sue Rodwell Williams, (1993): Nutrition, Diet Therapy, (7th Ed) : W.B. Saunders Company London.
4. Antia F.P. And Philip Abraham (2001) Clinical Nutrition and Dietetics, Oxford Publishing Company.
5. Gopalan C., Ram Sastri B.V. And Bal Subramaniam S.C., (2006) Nutritive Value of Indian Foods, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research.
6. Raheena M. Begum (1989): A Text Book of Foods Nutrition and Dietetics, Wiley Eastern Ltd., New Delhi.
7. Passmore P. And M.A. East Wood: Human Nutrition And Dietetics, Churchill Living Stone.
8. WohlShils and Goodheart: Modern Nutrition In Health And Disease, McLAren And Ubrman, Philadelphia.
9. Robinson Ch., M.B. Lawlea, W.L., Chenoweth, and A.E., Carwick: Normal and Therapeutic Nutrition, Macmillan Publishing Company.

Processing of Animal Based Foods

(22MVOCFSNC10)

Maximum Marks: 80 **Time: 3 Hours.**

Note: - There will be nine questions in all. The first question comprising short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks.

After completion of the course student will be able:

CO1: To understand need and importance of livestock, egg and poultry industry

CO2: To learn processing and preservation of animal based foods.

CO3: To know the compositional and processing aspects of milk, meat and fish products

UnitI

Milk: definition, types, composition and nutritive value; factors affecting composition of milk, physico-chemical properties of milk, technology, composition and process of manufacture of butter, ice cream and milk powder, cheese, technology of manufacture of indigenous milk products (ghee, lassi, khoa,channa, paneer, rasgulla, srikhand and gulab jamun).

Unit II

Structure and physico-chemical properties of muscle, meat: composition and nutritive value, conversion of muscle into meat, post mortem changes in meat, rigor mortis, cold shortening, pre-rigor processing; stunning and slaughtering methods.

Meat products: sources of meat and meat products, effect of feed, breed and management of meat production and quality. Slaughtering of animals and poultry inspection and grading of meat. Factors affecting post mortem changes, properties, shelf life of meat . Meat quality evaluation. Mechanical deboning, meat tenderization, ageing, pickling and smoking of meat.

UnitIII

Egg: Structure, composition and nutritive value of eggs, Storage and shelf life problems Quality evaluation of eggs: international and external quality evaluation, candling, albumen index, Haugh unit, yolk index etc. Egg preservation: grading of eggs, whole egg preservation, pasteurization, dehydration, freezing, egg products: egg powder, value added egg products (e.g., Meringues and Foams etc.), packaging of egg and egg products.

UnitIV

Fish processing: factors affecting quality of fresh fish, fish dressing, chilling, freezing, glazing, salting and canning of fish; manufacturing of fish paste, fish oil, fish protein concentrates and fish meal; by-products of fish industry and their utilization, scope and processing and of sea foods.

Recommended Readings:

1. De Sukumar, Outlines of Dairy Technology, Oxford University Press, Oxford. 2007.
2. Hall GM, Fish Processing Technology, VCH Publishers Inc., NY, 1992
3. Sen DP, Advances in Fish Processing Technology, Allied Publishers Pvt. Limited 2005
4. Shahidi F and Botta JR, Seafoods: Chemistry, Processing, Technology and Quality, Blackie Academic & Professional, London, 1994
5. Webb and Johnson, Fundamentals of Dairy Chemistry, 3rd ed., CBS Publishers, New Delhi 1988
6. Lawrie R A, Lawrie's Meat Science, 5th Ed, Woodhead Publisher, England, 1998
7. Parkhurst & Mountney, Poultry Meat and Egg Production, CBS Publication, New Delhi, 1997
8. Pearson & Gillet Processed Meats,3 Ed, CBS Publication, New Delhi, 1997
9. Shai Barbut,Poultry Products Processing,CRC Press 2005
10. Stadelman WJ, Owen J Cotterill Egg Science and Technology, 4th Ed. CBS Publication New Delhi, 2002

Discipline Specific (Elective)-2

Food Toxicology

(22MVOCFSND3)

Maximum Marks: 80 **Time: 3 Hours.**

Note: - There will be nine questions in all. The first question comprising short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks.

After completion of the course student will be able:

CO1: To know general principles and terminology of food toxicology

CO2: To classify various types of food toxicants.

CO3: To analyze the response of body towards food toxicants.

CO4: To evaluate and manage food toxicity.

Unit I

Principles of food toxicology: Introduction to food toxicology: classification, dose, determinants of toxins in foods; Risk assessment in food toxicology; laws and regulation of safety assessment of foods including food additives, environmental contaminants, pesticides and antibiotic residues. Legal requirements and specific screening methods as per OECD guidelines in vitro and in vivo studies; clinical trials.

Unit II

Natural toxins in food: natural toxins of importance in food- toxins of plant and animal origin; microbial toxins (e.g., bacterial toxins, fungal toxins and Algal toxins), toxicity and significance, determination of toxicants in foods and their management,

Allergens, toxic constituents and anti nutritional factors of plant foods (enzyme inhibitors, trypsin and chymotrypsin inhibitor, amylase inhibitor, flatulence causing sugars, phytolectins).

Unit III

Food additives and toxicants added or formed during food processing: safety of food additives; toxicological evaluation of food additives; food processing generated toxicants: nitroso-compounds, heterocyclic amines, dietary Supplements and toxicity related to dose: common dietary supplements; relevance of the dose; possible toxic effect**.**

Unit IV

Environmental contaminants and drug residues in food: fungicide and pesticide residues in foods; heavy metal and their health impacts; use of veterinary drugs (e.g. Malachite green in fish and βagonists in pork); other contaminants in food, radioactive contamination of food, Food adulteration and potential toxicity of food adulterants.

Recommended Readings:

1. Shibamato T. and Bjeldanes L., Introduction to Food Toxicology, Academic Press, Inc. San Diego, CA. ISBN 0-12640025-3
2. Deshpande, S.S. (2002). Handbook of Food Toxicology, Marcel Dekker Inc. NY ISBN 0-8247-0760- 5
3. William H. W., Essentials of Environmental Toxicology. Taylor & Francis, Philadelphia, PA. ISBN 1-56032-470-4
4. Fennema, O, Food Chemistry. Marcel Dekker 1997.

Discipline Specific (Elective)-2

Institutional Food management and Marketing

(22MVOCFSND4)

Maximum Marks: 80 **Time: 3 Hours.**

Note:-There will be nine questions in all. The first question comprising of short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks.

After completion of the course student will be able:

CO1: To know food marketing definition and characteristics of rural/urban marketing

CO2: To learn the characteristics of opportunities and challenges in food marketing for SMEs

CO3: To deliberate on Rural and urban Marketing segmentation, consumer behavior and changing trends.

CO4: To understand Product design - Importance of innovation, appropriate pricing. Network setup for raw material procurement and finished product distribution

CO5: To learn techniques of Sales promotion, design of advertisement & marketing campaign techniques, online marketing, target customers

CO6: To know role of food packaging for safety and present ability of product and importance of labeling for consumer acceptability

CO7: To understand relevance of Marketing information system and marketing research in accessing consumer behavior.

UnitI

Menu planning and food service : Factors affecting menu planning , Types of menus, wording of menu and construction of menu card,Delivery and Service of Foods, Food service systems : Conventional Commissary ready prepared assembly service ; Types of service : Self-service, tray service, waiter-waitress service, portable meals ; Types of food services: Campus food service, Food service in commercial restaurants, Hotel Food service, Hospital food service, Industrial food service, School food service.

Unit II

Food purchasing, selection and storage: Food Purchase: Food purchasing procedure, Purchasing methods, Selection of foods, Important points to be observed for various food commodities, Importance of sanitary procedures while preparing, cooking and holding of foods; Food Storage: General Guidelines

for Storage of food, Dry Storage, Refrigerated Storage. Freezer Storage, Importance of pest control

Quantity food production: Construction and selection of recipes for quantity cooking Standardization of recipe, Storage and use of leftover foods, Quality control of food production, hygiene and safety procedures for prevention of contamination of raw and cooked foods for different areas of food service for personnel working in food service

Unit III

Food marketing: Definition, meaning, characteristics of rural and urban marketing. Opportunities and challenges marketing food products by small scale entrepreneurs; Rural marketing segmentation, rural consumer behaviour, changing trends in rural consumer selection and decision, marketing process and influential factors, marketing needs for export products; Urban marketing segmentation, urban consumer behaviour, changing trends in urban consumer selection and decision, marketing process and influential factors.

Unit IV

Product design: Innovativeness presentation, services, prices, method of pricing, network for sourcing raw materials and distribution of products in both rural and urban area Online Marketing: Target population, product packing, distribution through courier and other mode of transportation**.**

Recommended Readings:

1. Singh B.P., Management Concepts & Practices, Dhanpat Rai & sons, Nai Sarak, Delhi.
2. Naidu NVRand Krishna Rao T (2009). Management and Entreneurship, I.K. International
3. Pvt. Ltd.
4. Jane Eastham, Liz Sharples & Stephen Ball (2001). Food Supply Chain Management,
5. Elsevier Science.
6. Dwivedi R.S. Management – An Integrated Approach, National Publishing Co., Delhi.
7. Small scale food entrepreneurship: A technical guide for food ventures, authored & published by Northeast Centre for Food Entrepreneurship

Discipline Specific (Elective)-3

Nutraceuticals and Functional Foods

(22MVOCFSND5)

Maximum Marks: 80 **Time: 3 Hours.**

Note:-There will be nine questions in all. The first question comprising short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks. After completion of the course student will be able:

CO1: To understand the basic concept of food nutraceuticals and functional foods.

CO2: To learn about health benefits of nutraceuticals and its role in disease prevention.

CO3:To know how to develop functional foods.

Unit I

Nutraceuticals and functional Foods –Definition, concept, history and market; Evolution of nutraceuticals and functional foods market. Classification of nutraceuticals and functional foods. Significance and relevance of nutraceuticals and functional foods in the management of diseases and disorders.

Unit II

Isolation of phytochemicals from plant materials: Care in handling and storage of raw materials with minimal damage to sensitive bioactive compounds; Extractive methods for maximum recovery and minimal recovery and minimal destruction of active material; stability studies. Recent developments in the isolation, purification and delivery of phytochemicals. Health benefits of phytochemicals and natural pigments in nutraceutical and functional foods.

Unit III

Prebiotics, probiotics and symbiotics- Probiotics: Definition, types and relevance; Usefulness in gastro intestinal health and other health benefits; development of a probiotic products; recent advances in probiotics; Challenges and regulatory issues related to probiotic products. Prebiotics: Prebiotic ingredients in foods; types of prebiotics and their effects on gut microbes; health benefits of prebiotics; recent development in prebiotics and Symbiotics.

Unit IV

Functional foods - Definition, development of functional foods, use of bioactive compounds in appropriate form with protective substances and activators; Effect of environmental condition and food matrix; Effects of processing conditions and storage; Development of biomarkers to indicate efficacy of functional ingredients; Research frontiers in functional foods; delivery of immunomodulators /vaccines through functional foods. Nutrigenomics-concept of personalized medicine.

Recommended Readings:

1. Brigelius-Flohé, J & Joost HG. (2006). Nutritional Genomics: Impact on Health and Disease.Wiley VCH.
2. Cupp J & Tracy TS. (2003). Dietary Supplements: Toxicology and Clinical Pharmacology. Humana Press.
3. Gibson GR & William CM. (2000). Functional Foods - Concept to Products.
4. Goldberg I. (1994). Functional Foods: Designer Foods, Pharma Foods.
5. Losso JN. (2007). Angi-angiogenic Functional and Medicinal Foods. CRC Press
6. Neeser JR & German BJ. (2004). Bioprocesses and Biotechnology for Nutraceuticals.Chapman & Hall.
7. Robert EC. (2006). Handbook of Nutraceuticals and Functional Foods. 2nd Ed. Wildman.
8. Shi J. (2006). Functional Food Ingredients and Nutraceuticals: Processing Technologies.CRC Press
9. Webb GP. (2006). Dietary Supplements and Functional Foods. Blackwell Publ.

Food Safety and Quality Control

(22MVOCFSND6)

Maximum Marks: 80 **Time: 3hours**

Note: - There will be nine questions in all. The first question comprising short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks.

After completion of the course student will be able:

CO1: To know Food safety laws and standards.

CO2: To understand environmental sanitation and the link between environmentalsanitation and health

CO3: To know the importance of personal hygiene and environmental
sanitation

CO4: To assess and practice controlling factors in the environment that canpotentially affect public health**.**

Unit I

Introduction to concepts of food quality, food safety, food quality assurance and food quality management; objectives, importance and functions of quality control, Current challenges to food safety. Quality assurance, quality control, total quality management and food safety management, concept of food traceability for food safety.

Food adulteration, nature of adulterants, methods of evaluation of food adulterants and toxic constituents.

Unit II

Food safety programs: good manufacturing and management practices, good hygienic practices, good lab practices, general awareness and HACCP system ; its prerequisites, principles, and applications in food safety.

Microbial quality control in food industry: determination of microorganisms in foods by cultural, microscopic, physical, chemical methods.

Statistical quality control in food industry

Unit III

Food hygiene and sanitation system: general aspects and significance of food hygiene and sanitation, cleaning in place system(CIP), different types of cleaning and sanitizing agents and their applications,

sanitary design of equipment and infrastructure, sanitation program; (SSOPs), education and training programs.

Unit IV

Food safety and Standards Act 2006: salient provision and prospects

Role of national and international regulatory agencies, Bureau of Indian Standards (BIS), AGMARK, Food Safety and Standards Authority of India (FSSAI), Introduction to WTO agreements: SPS and TBT agreements, Codex alimentarious commission, USFDA, International organization for standards (ISO) and its standards for food quality and safety (ISO 9000 series, ISO 22000, ISO 15161, ISO 14000).

Recommended Readings:

1. Early. R. (1995): Guide to Quality Management Systems for the Food Industry, Blackie, Academic and professional, London.
2. Gould, W.A and Gould, R.W. (1998). Total Quality Assurance for the Food Industries, CTIPublications Inc. Baltimore.
3. Pomeraz, Y. and MeLoari, C.E. (1996): Food Analysis: Theory and Practice, CBS publishersand Distributor, New Delhi.
4. Bryan, F.L. (1992): Hazard Analysis Critical Control Point Evaluations A Guide toIdentifying Hazards and Assessing Risks Associated with Food Preparation and Storage.World Health Organization, Geneva
5. Kirk, R.S and Sawyer, R. (1991): Pearson s Composition and Analysis of Foods, LongmanScientific and Technical. 9th Edition, England.
6. Food and Agricultural Organization (1980): Manuals of Food Quality Control. 2 AdditivesContaminants Techniques, Rome.
7. Furia, T.E. Ed. 1980. Regulatory Status of Direct Food Additives. CRC Press, Florida.
8. Krammer, A. and Twigg, B.A. (1970). Quality Control for the Food Industry. 3rd Edn.AVI, Westport.
9. Rekha S. Singhal , Pushpa R. Kulkarni, Dananesh V. Rege, (1997). Hand Book of Indicesof food Quality and Authenticity, wood head Publishing Ltd.
10. Hubbard, Merton R. (2003). Statistical Quality Control for the Food Industry, 3rd Edition,Springer.

Food Packaging and Nutritional Labeling

(22MVOCFSNC11)

Maximum Marks: 80 **Time: 3 Hours.**

Note: - There will be nine questions in all. The first question comprising of short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks.

After completion of the course student will be able:

CO1: To understand the basic principles of food packaging.

CO2: To provide an understanding of various packaging materials for different foods.

CO3: To learn about sustainable packaging (green packaging) and smart packaging solutions.

CO4: To get acquainted with the various labeling rules and importance of food package labeling

Unit I

Introduction to Food Packaging: Packaging terminology, types and functions of food packaging, Packaging environment. Characteristics of food stuff that influences packaging selection, Safety considerations in food packaging – types of food safety problems associated with package, package labeling and food safety.

Unit II

Paper and paper based packaging materials: types of paper (Kraft, bleached, greaseproof, glassine), and functional properties of paper; testing of paper packaging materials. Plastic packaging materials: classification of polymers, functional and mechanical properties of thermoplastic polymers; processing and converting of thermoplastic polymers (extrusion, blow molding, injection molding, compression molding, lamination and heat sealing); testing of plastic packages.

Metal packaging materials: container making processes, Tin plate containers- quality control tests.Glass packaging materials: composition and manufacture of glass containers, testing of glass containers.

Unit III

Packaging systems and methods: vacuum packaging, MAP, intelligent packaging, microwave packaging, retort processing, aseptic packaging of food ; its definition, tools and advantages, Edible films and edible coating, use of edible coatings as packaging in food system,

Packaging requirements of selected foods- cereal and snack food, beverages, milk and dairyproducts, poultry & eggs, red meat and frozen foods.

Unit IV

Packaging Design & Environmental Issues in Packaging: Food marketing and role of packaging- bar coding.

Labeling rules and regulations, concept of Nutritional labeling on food package, serving sizes, daily intake values, health claims etc. Labeling requirements for pre-packaged foods, Food Safety and Standards (Packaging and Labelling) Regulations, 2011, Nutritional labeling and educational act (NLEA).

Recommended Readings:

1. Food and Package Engineering, Scott A Morris, Wiley Blackwell, 1st ed, 2011
2. Food Processing Technology, Principles and Practice – Fellows – 4 th Edition – Woodhead Publishing
3. Robertson, G. L (2006). Food Packaging: Principles and Practice (2nd ed.), Taylor &Francis
4. Sacharow, S. and Griffin, R.C. (1980) Principles of Foods Packaging, 2nd Ed., Avi Publication Co. Westport, Connecticut, USA.

Entrepreneurship Development in Food Processing Industry

(22MVOCFSNC12)

Maximum Marks: 80 **Time: 3 Hours**

Note:-There will be nine questions in all. The first question comprising of short answer type questions covering the entire syllabus will be compulsory. The remaining eight questions will comprise of a set of two questions from each unit and the candidate will be required to attempt four questions selecting at least one from each unit. All questions carry equal marks.

After completion of the course student will be able:

CO1: To understand the concept and need of entrepreneurship development

CO2: To learn theories of entrepreneurship development and their practical implication.

CO3: To know challenges in the progress of entrepreneurship development in India.

CO4: To learn entrepreneurial skills, documentation and legal requirements for setting up a unit.

UnitI

Entrepreneurship: Definition, concept, growth and role. The Entrepreneur: types, characteristics, theories of entrepreneurial class, urges and importance of entrepreneurship stimulants; seed-beds of entrepreneurship, influencing factors; problems (Operational and Non-Operational) and obstacles; entrepreneurial management; role of socio-economic environment.

Unit II

Nature, scope and importance of entrepreneurship; business ideas, source of business ideas, feasibility studies, problem solving and decision making.

Agricultural sector and food processing industry problems and opportunities; self employment need and entrepreneurship in foods sector, project sizing, fund management and enterprise management issues in food entrepreneurship, entrepreneurship development policies of government in food business.

Unit III

New Food Products development, Ideas of new food product development, Definition, classification, characterization, factors influencing new product development– social concerns, health concerns, impact of technology and market place influence.Phases in Food Product Development prototype,

Standardization, Sensory Evaluation: Descriptive, threshold and acceptance test. Shelf life testing- types of shelf life testing mode of food deterioration. Technical development – recipe development and scale up. Product integrity and conformance to standards.

Unit IV

Promotion of a food venture, Legal Framework for establishing and fund raising Venture capital: Sources and documents required. Entrepreneurial Development: Meaning, need, programmes, cycle and objective. Entrepreneurship development programmes in India: An Evaluation, Role of FSAAI in food entrepreneurship development, role of agencies in financing and project preparation and implementation

Recommended Readings:

1. Tandon. B.C. Environment and Entrepreneur, Chugh Publication, Allahabad.
2. SinerA David: Entrepreneurial Megahuks: John Wiley and Sons, New York.
3. Srivastava S.B. : A practical Guide to Industrial Entrepreneurial, Sultan Chand and sons, New Delhi.
4. Parsana Chandra: Project preparation n, Appraisal, Implementation; Tata McGraw Hill, New Delhi.
5. Pandey, I.M. Venture Capital – The Indian Experience, Prentice Hall of India.
6. Halt: Entreprenerurship – New Venture Creation; Prentice Hall of India
7. Food Safety and Standards Authority of India