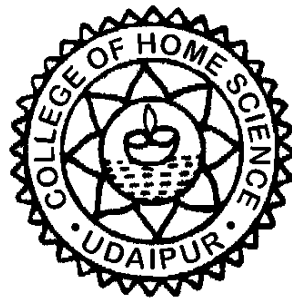


B.Sc. (Hons.) Food Nutrition and Dietetics

Syllabus

2018-19



COLLEGE OF COMMUNITY AND APPLIED SCIENCES

**Maharana Pratap University of Agriculture and
Technology, Udaipur – 313 001**

Semester Wise Course Distribution

First Year B.Sc. (Hons.) Food Nutrition and Dietetics

I-SEMESTER

S. No.	Course Title	Course No.	Credit Hours	Page No.
1.	Nutritional Biochemistry-I	FND 111	3 (2+1)	5
2.	Food Science and Processing	FND 112	3 (2+1)	6
3.	Methods of Cookery	FND 113	3 (2+1)	8
4.	Milk and Milk Products - Preparation and Utilization	FND 114	4 (2+2)	9
5.	Cereals and Millets : Preparation and Utilization	FND 115	3 (2+1)	10
6.	General English-I	ENG 112	2 (1+1)	12
7.	Environmental Studies and Disaster Management	RMCS 112	3 (2+1)	13
8.	NSS/NCC/NSO	NSS/NCC	–	
Total			21 (13+8)	

II-SEMESTER

S. No.	Course Title	Course No.	Credit Hours	Page No.
1.	Food Service Management –I	FND 121	3 (2+1)	15
2.	Nutritional Biochemistry -II	FND 122	3 (2+1)	16
3.	Food Processing and Packaging	FND 123	3 (2+1)	17
4.	Sports Nutrition and Physical Fitness	FND 124	3 (2+1)	19
5.	Fruits and Vegetables: Preparation and Utilization -1	FND 125	2 (1+1)	20
6.	Elementary Human Physiology	FSN 121	3 (2+1)	21
7.	Technical Writing (English)	ENG 121	2 (1+1)	23
8.	Agricultural Informatics	COMP 121	3 (1+2)	24
9.	NSS/NCC/NSO	NSS/NCC	–	
Total			22 (13+9)	

Second Year B.Sc. (Hons.) Food Nutrition and Dietetics

III-SEMESTER

S. No.	Course Title	Course No.	Credit Hours	Page No.
1.	Fundamental of Food Microbiology	FND 211	3 (2+1)	25
2.	Principles of Human Nutrition	FND 212	3 (2+1)	26
3.	Food Preservation and Storage	FND 213	4 (1+3)	28
4.	Bakery and Confectionary	FND 214	4 (2+2)	29
5.	Pulses & Oil Seeds : Preparation and Utilization	FND 215	3 (2+1)	31
6.	Food Toxicology	FND 216	2 (2+0)	32
7.	Elementary Statistics	STAT 211	3 (2+1)	32
8.	NSS/NCC/NSO	NSS/NCC	–	
Total			22 (13+9)	

IV-SEMESTER

S. No.	Course Title	Course No.	Credit Hours	Page No.
1.	Normal Nutrition and Meal Planning	FND 221	4 (2+2)	34
2.	Nutrition Through Life Cycle	FND 222	3 (2+1)	35
3.	Food Product Development and Formulation	FND 223	4 (2+2)	36
4.	Food Chemistry	FND 224	4 (3+1)	38
5.	Food Standards and Quality Control	FND 225	3 (2+1)	39
6.	Communication Skills and Personality Development	HDFS 222	3 (2+1)	41
7.	NSS/NCC/NSO	NSS/NCC	2 (0+2)	
Total			23 (13+10)	

Third Year B.Sc. (Hons.) Food Nutrition and Dietetics

V-SEMESTER

S. No.	Course Title	Course No.	Credit Hours	Page No.
1.	Introduction to Clinical Nutrition	FND 311	4 (3+1)	43
2.	Therapeutic Nutrition - I	FND 312	4 (2+2)	44
3.	Food Hygiene and Sanitation	FND 313	2 (1+1)	46
4.	Community Nutrition	FND 314	3 (2+1)	48
5.	Nutrition Education	FND 315	3 (1+2)	49
6.	Economics and Marketing	RMCS 312	3 (2+1)	50
7.	Introduction to Rural Sociology	EECM 311	2 (2+0)	52
Total			21 (13+8)	

VI-SEMESTER

S. No.	Course Title	Course No.	Credit Hours	Page No.
1.	Therapeutic Nutrition - II	FND 321	3 (2+1)	53
2.	Nutraceuticals and Health Foods	FND 322	3 (2+1)	54
3.	Meat and Meat Products : Preparation and Utilization	FND 323	3 (3+0)	56
4.	Food Analysis	FND 324	4 (2+2)	57
5.	Nutrigenomics	FND 325	3 (3+0)	59
6.	Public Health Nutrition	FND 326	4 (3+1)	59
7.	Nutrition in Emergencies	FND 327	2 (2+0)	61
Total			22 (17+5)	

Fourth Year B.Sc. (Hons.) Food Nutrition and Dietetics

VII-SEMESTER

S. No.	Course Title	Course No.	Credit Hours	Page No.
1.	Fruits and Vegetables :Preparation and Utilization –II	FND 411	2 (0+2)	62
2.	Nutritional Status Assessment Methods	FND 412	3 (0+3)	62
3.	Food Service Management –II	FND 413	3 (0+3)	63
4.	Diet and Nutrition Counseling	FND 414	3 (0+3)	64
5.	Special Project	FND 415	4 (0+4)	65
6.	Entrepreneurship Development and Business Management	FND 416	4 (0+4)	66
7.	Seminar	FND 491	1 (0+1)	66
Total			20 (0+20)	

VIII-SEMESTER

S. No.	Course Title	Course No.	Credit Hours	Page No.
1.	In-Plant Training / RAWE	INT 421/ RAWE 421	20 (0+20)	66
Total			20 (0+20)	

First Year B.Sc. (Honours) Food Nutrition and Dietetics

I-SEMESTER

FND 111

Nutritional Biochemistry-I

3 (2+1)

Theory

S. No.	Topics	No .of Lectures
1.	Introduction to biochemistry -Definition, objectives, scope and Inter relationship between biochemistry and other biological sciences	2
2.	Intermediary metabolism -Carbohydrate definition, classification, functions, structure	4
3.	Metabolism, glycolysis, TCA cycle and energy generation, HMP shunt	4
4.	Gluconeogenesis, glycogenesis, glycogenolysis, blood sugar regulation	4
5.	Lipids -Definition, classification, structure, function Oxidation and biosynthesis of fatty acids (saturated and mono-unsaturated)	4
6.	Synthesis and utilization of ketone bodies, ketosis, fatty livers .	4
7.	Proteins -General reaction of amino acid metabolism, deamination, transamination, decarboxylation, urea cycle.	4
8.	Lipoproteins -Types, composition, role and significance in disease	4
9.	Molecular aspects of transport, passive diffusion, facilitated diffusion, active transport.	2
	Total	32

Practical

S. No.	Experiment	No .of Practicals
1.	Handling of equipment and instruments; Qualitative and quantitative tests of carbohydrates	3
2.	Qualitative analysis of amino acids	2
3.	Qualitative analysis of proteins	2
4.	Determination of acid values	2
5.	Saponification and iodine numbers.	2
6.	Paper chromatography of amino acids or carbohydrates ascending and descending .	2
7.	Estimation of nitrogen by Kjeldhal method .	2
8.	Estimation of fat by soxhlet method.	1
	Total	16

Suggested Reading

- West, E .S., Todd, W .R.; Mason .H.S .and Van Bruggen J.T :.4th Ed .Text book of Biochemistry. Amerind Publishing Co .Pvt .Ltd .
- Murray, R .K .Grannen, D .K.; Mayes, P .A .and Rodwell .V .W :.Harper's biochemistry .Lange Medical Book.
- Handler, P. Smith E.I.; Stelten, D.W. : Principles of biochemistry, Mc. Grew Hill Book Co.
- Lehninger, A.L.; Nelson, D .L .and Cox, M .M .Principles of Biochemistry .CBS Publishers and Distributors.
- Devlin, T.M. : Text Book of Biochemistry with Clinical Corelations. John Wiley and Sons.
- Stryer .L .biochemistry .Freeman W.H .and Co.Assaini .J.An Introduction of Practical Biochemistry :D .Plummer Practical biochemistry :K Wilson and Walker Biochemical methods : S .Sadasivan and K Manikam Hawk's physiological Chemistry :B .L .Oser)ed(
- Practical Biochemistry :R .L .Nath .A treatise on Analysis of Food, Fats and Oils :A .R .Sen, N.K .Pramanik and S.K .Roy.

FND 112

Food Science and Processing

3 (2+1)

Theory

S . No.	Topics	No .of Lectures
1	Objectives of cooking, processing, preservation, methods of cooking with their merits and demerits .Effect of cooking and heat on nutritive value of foods	2
2	Cereals, millets and pulses :Composition and nutritive value, types, storage, processing	2
3	Cereal cookery :Gluten and factors affecting the gluten formation, cereal starch, gelatinization, dextrinisation	2
4	Pulse and legumes cookery .Composition, Effect of heat, acid and alkali on cooking of pulses, factors affecting cooking quality, toxic constituents in pulses, processing of pulses	3
5	Nuts and oilseeds -Composition and nutritive value, types, storage, oil extraction, processing, toxic constituents and role in cookery	2
6	Milk and milk products :Composition and nutritive value, properties, processing and packaging, effect of heat, acid, enzymes, microbes, processed and indigenous milk products and their quality, role in cookery	3
7	Eggs -Structure, composition and nutritive value, storage, grading and evaluation of quality of egg, role of egg in cookery	2
8	Flesh foods -Structure, composition and nutritive value, types, storage, evaluation of quality and selection of meat, fish and poultry, methods of cooking, brief description of ageing, tenderization and curing	3

S . No.	Topics	No .of Lectures
9	Vegetables and fruits :Composition and nutritive value, types, storage, selection, post-harvest changes, effect of processing, preservation and cooking on different pigments of both fruits and vegetables	3
10	Sugar and its products :Composition and nutritive value, types, function, properties, stages in sugar cookery, role of sugar in cookery	2
11	Fats and oils - Composition, nutritive value, types, role in cookery and importance in daily diet	2
12	Spices and herbs - Types and its use	1
13	Beverages and appetizers - Classification, use in everyday lives with special reference to tea, coffee, cocoa and alcoholic drinks	2
14	Leavening agents - Classification and functions	2
15	Processed and convenience foods, Ready to eat foods, Frozen foods, Dehydrated foods, Instant food mixes	1
	Total	32

Practical

S.No.	Experiments	No .of Practicals
1.	Laboratory conduct and responsibilities; knowledge of different food stuffs in English, Hindi and local language	1
2.	Terms used in cookery, weights and measures; identification and use of different kitchen items and equipments	2
3.	Identification and listing of various food groups; market survey of processed and preserved foods	2
4.	Cereal cookery :Preparation of plain rice (open and pressure cook), lime-rice, pulao, paratha, chapatti, upma and halwa	1
5.	Pulse cookery :Preparation of plain dal, dal with green, pakoras, sambar, Preparation of cereal and pulse combined recipes -Idlis, adai	2
6.	Nuts and oilseeds :Preparation of chikki, tilladoos, thandai,	1
7.	Milk cookery :Preparation of curd and paneer	1
8.	Egg cookery :Selection of egg, preparation of boiled egg, scrambled egg, poached egg	1
9.	Fruits and vegetables cookery :Preparation of sauces, pickles, squash, chips, Sabjis and salad	1
10.	Sugar cookery :Preparation of fudge and fondent, Process of caramalization; demonstration of 1-thread and 2-thread consistency	1
11.	Fats and oils : Preparation of puris, cakes and biscuits	1
12.	Appetizers, Preparation of red tea, white tea, coffee, egg nog	1
13.	Visit of food industries	1
	Total	16

Suggested Readings

- Potter, N.N. (1996). Food Science .The AVI Publishing Company, Inc., Westport, Connecticut.
- Sehgal, S., Grewal, R.B., Kawatra, A .and Kaur, Y. (1997). Practical Aspects of Food Preservation .Directorate of Publications .Haryana Agricultural University, Hisar.
- Khadder V., (1999). Text book of Food, Storage and Preservation .Kalyani Publishers, New Dehi.
- Kalia, M .and Sood, S. (2010). Food Preservation and Processing. Revised Edition, Kalyani Publishers, New Delhi .
- Jood, S. and Khetarpaul, N. (2002). Food Preservation .Geeta Somani Agrotech Publishing Academy, Udaipur.
- Sivasankar, B. (2002). Food Processing and Preservation .PHI Learning Pvt .Ltd .Delhi.

FND 113

Methods of Cookery

3 (2+1)

Theory

S.No.	Topic	No .of Lectures
1.	Kitchen attire and equipments	3
2.	Cooking of food, heat and heat transfer	3
3.	Cooking methods	3
4.	Effect of cooking on food and their nutritive value of foods	4
5.	Basics of culinary practice	3
6.	Thickening and binding agents	3
7.	Basic flavoring stocks, essence and glazes	3
8.	Sauces soups garnishes	3
9.	Basics of cookery of various food -cereals, pulses, egg, fish, meat and poultry	4
10.	Principles and practice of boiling, steaming, frying, stewing, roasting, baking, grilling and combined methods of cookery	3
	Total	32

Practical

S.No.	Experiment	No .of Practicals
1.	Preparation of recipes from different food groups such as:	2
2.	cereals	1
3	pulses,	1
4	eggs	1
5	vegetables, fruits	2
6	milk	1

S.No.	Experiment	No .of Practicals
7	Preparation of food product using various cooking method	2
8	Boiling,	1
9	Steaming,	1
10	Frying,	1
11	Stewing,	1
12	Roasting and Baking, Grilling	1
13	Combined methods of cookery	1
	Total	16

Suggested Readings

- Fuller J. (1966). Chefs manual and kitchen management, B.T .Badtsford Ltd.
- Treat N. and Richard S. (1977). Quantity cookery .Little brown and Co.
- Klest, B.B., Wood, L., Horger, V.F .and Shugart G.S. (1977). Food Service in Institutions, John Kliley and Sons.
- Srilakshmi, B. (2010). Food Science .5thedn .New Age International .Pvt .Limited.
- Swaminathan, M.S. (1993). Food science and experimentalfoods .Ganesh.

FND 114 Milk and Milk Products :Preparation and Utilization 4 (2+2)

Theory

S. No.	Topics	No. of Lectures
1.	Introduction, importance and scope of fluid milk industry in India and abroad: Brief history and present status	3
2.	Composition of milk, nutritive value of milk of cow and buffalo.Physico-chemical properties of milk and milk constituents: Physical state, acidity, pH, density and specific gravity, freezing point, colour and flavor	4
3.	Types of milk_ Sterilized Milk; Homogenized Milk; Flavoured Milks; Standardized Milk; Reconstituted/Re-hydrated Milk; Recombined Milk; Toned Milk.	4
4.	Milk products- traditional products- butter, ghee,khoa, cheese in theory	3
5.	Steps of milk processing: collection, chilling, standardization, pasteurization, homogenization, bactofugation, and principles of dehydration	3
6.	Waste management Quality control aspects of milk: Status of antibiotics, pesticides, heavy metals etc, cleaning and sanitization procedures	3
7.	Good manufacturing practices, implementation of HACCP standards, cleaning and sanitization of fluid plant:	3
8.	Indian standards for milk and milk products as per PFA,BIS,AGMARK etc.	3
9.	Judging and grading of milk	3
10.	Defects in milk, their causes and prevention	3
	Total	32

Practical

S. No.	Topics	No. of Lectures
1.	Sampling of milk. Estimation of fat, SNF, TS platform tests.	4
2.	Cream separation. Detection of adulterants	4
3.	Microbiological quality evaluation of milk and milk products	4
4.	Preparation of milk products. Paneer, channa, icecream, khoa,	4
5.	burfi, flavoured milk, rasogulla	4
6.	Visit to modern milk processing and manufacturing plants.	4
7.	Visit to a dairy unit to understand various kinds of designs and layouts of plants, Value addition of fluid milk	4
8.	Demonstration on detection of adulterants in milk	4
	Total	32

Suggested Readings

1. Aneja R.P., Mathur B.N., Chandan, R.C., and Banerjee, A.K. (2002). Technology of Indian milk products .Dairy India Yearbook.
2. Jenness, R .and Patton S. (1959). Principles of Dairy Chemistry .
3. Lampert, L.M. (1970) Modern dairy products. Chemical Publishing Company Inc .New York.
4. Srinivasan, M .R .and Anantkrishanan C.P. (1964). Milk Products of India.
5. Sukumar, De. (2001). Out lines of dairy technology Oxford Uni .Press New Delhi.

FND 115

Cereals and Millets : Preparation and Utilization

3 (2+1)

Theory

S. No.	Topics	No. of Lectures
1.	Major cereals and millets of India, structure and composition of cereal grains, storage of cereals	3
2.	Suitability of commercial grains for processing, physical changes during cooking or other changes due to acid alkali heat cold and pressure	3
3.	Wheat types and wheat hardness - Soft wheat, hard wheat, durum wheat Suitability of wheat flour for particular end use, flour treatments, gluten and functionality, dough rheology, bread quality, Rheological tests-Mixograph, farinograph, alveograph, extensograph, paste viscosity properties wheat products	4 3
4.	Wheat milling operations, commercial roller flour milling,	1
5.	Rice- Structure and composition, rice milling, milled rice, ageing of rice, parboiling of paddy, cooking of rice,	3

S. No.	Topics	No. of Lectures
6.	Processed rice products and by-products, fermented rice products	3
7.	Maize and sorghum- Structure, composition, milling	3
8.	Barley, oat and millets- Structure, composition, malting, milling	3
9.	By products utilization of all commercial grains	3
10.	Preparation of flakes, starch, syrup, germ oil and steep liquor	3
	Total	32

Practicals

S. No.	Topics	No. of Lectures
1.	Physico-chemical properties of grains	10
2.	Quality test of rice – amylase content determination	2
3.	Estimation of gluten content	1
4.	Demonstration on Rheological tests-Mixograph, farinograph, alveograph, extensograph , paste viscosity properties	4
5.	Chemical tests- Sedimentation test, flour swelling volume, starch gelatinization,	3
6.	Preparation of wheat products- Bread and biscuits	5
7.	Preparation of fermented rice products	4
8.	Visit to flour mills, rice mills, bakery units	3
	Total	32

Suggested Readings

- Khader, V. (2001). Text book of food science and technology .Directorate of information and Publications of Agriculture, ICAR, KrishiAnusandhan Bhawan, Pusa, New Delhi.
- Srilakshmi B. (2001). Food science .New Age International Pvt .Ltd .New Delhi.
- Salunkhe, D .and Deshpande, S.S. (1991). Foods of plant origin :Production, technology and human nutrition .The AVI Publishings Inc.New York.
- Ram, S and Mishra, B. (2010). Cereals-processing and nutritional quality .New India Publishing Agency, PitamPura, New Delhi.
- Potty, V.H .and Mulky, M.J. (1993). Food processing. Oxford and IBH.
- Fellow, P.J. (2009). Food processing Technology 3rd Ed. Wood Publishing Ltd .Cambridge England .
- Manay N.S and Shadaksharaswamy, M. (2001). Foods facts and principles .Wiley Eastern Ltd . New Delhi, Bangalore, Bombay, Calcutta , Hyderabad.

Objectives

- To enhance syntactic understanding among students.
- To develop language proficiency among the students.

Theory

S. No.	Topic	No. of Classes
1.	Determiners, Prepositions	1
2.	Concord, Tenses, Conditional Sentences	2
3.	Modal Verbs, Direct/indirect narration	2
4.	Precise writing, Easy writing, Letter writing, CV writing	4
5.	One word substitution, Word formation, Idiomatic Expressions	2
6.	Study of Prose and short stories from BRIGHTER ENGLISH (book of short stories), Plays, Poems and Essays by C.E. Eckersley, Orient Longman, New Delhi, 1984) The Bachelor of Arts by R.K. Narayan	5
	Total	16

Practicals

S. No.	Topic	No. of Classes
1.	Based on Lectures Language work: the prescribed lessons having a bearing on the topics covered in lectures.	5
2.	Identification of phonetic sounds and symbols Stress and Intonation	6
3.	Listening Comprehension Conversation Practice	5
	Total	16

Suggested Readings

- Allen, W. Standard. 1962 Living English Structure, Orient Longmans, London.
- Jones, Daniel. 1993. Everyman's English Pronouncing Dictionary, University Book Stall, New Delhi.
- Jones, Daniel. 1970. An Outline of English Phonetics, Arnold, London.
- George, H.V. 1970. Common Errors in English Learning, M/s Newbury House, London.
- Sharma, S.D. 1984. A textbook of Spoken and Written English, Vikas, Delhi.

Theory

S.No.	Topic	No. of Lectures
1.	Multidisciplinary nature of environmental studies Definition, scope and importance.	1
2.	Natural resources Renewable and non renewable resources and their associated problems. Forest resources Use and over exploitation, deforestation, timber extraction, mining, dams and their effects on forest and tribal people.	2
3.	Water resources Use and over utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.	1
4.	Mineral resources Use and exploitation, environmental effects of extracting and using mineral resources.	1
5.	Food resources World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer pesticide problems, water logging, salinity.	2
6.	Energy resources Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Land resources Land as a resource, land degradation, man induced landslides, soil erosion and desertification.	2
7.	Role of an individual in conservation of natural resources, equitable use of resources for sustainable lifestyles.	2
8.	Ecosystems Concept, structure and function of an ecosystem. Producers, consumers and decomposers, energy flow in the ecosystem, ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of forest, grassland, desert and aquatic ecosystems.	3
9.	Biodiversity and its conservation. Introduction, definition, genetic, species, ecosystem diversity and biogeographical classification of India. Value of biodiversity Consumptive use, productive use, social, ethical, aesthetic and option values. Value of biodiversity diversity nation. Hotspots of biodiversity. Threats to biodiversity Habitat loss, poaching of wildlife, man wildlife conflicts, endangered and endemic species of India. In situ and Ex situ conservation of biodiversity.	4
10.	Environmental pollution Definition, cause, effects and control measures of air, water, soil, marine, noise and thermal pollution and nuclear hazards. Solid waste management Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.	2
11.	Social issues and the environment. Unsustainable to sustainable development, urban problems related to energy. Water conservation, rain water harvesting, watershed management. Environmental ethics.	1
12.	Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.	1

S.No.	Topic	No. of Lectures
13.	Environment protection acts. Air (Prevention and control of pollution) act, water (Prevention and control of pollution) act, wildlife protection act, forest conservation act, Issues involved in enforcement of environmental legislation, public awareness.	2
14.	Human population and the environment. Population growth, variation among nations, population explosion. Role of Information Technology in environment and human health.	1
15.	Natural disasters Meaning and nature, types (floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, heat and cold waves, global warming, sea level rise, ozone depletion) and effects.	2
16.	Man made disasters Nuclear, chemical, and biological disasters, building fire, coal fire, forest fire, oil fire, road accidents, rail accidents, air accidents, sea accidents. Disaster management	2
17.	International strategy for disaster reduction at national and global levels; National disaster management framework	1
18.	Financial arrangements, role of NGOs, community-based organizations and media, central, state, district and local administration, armed forces in disaster response, police and other organizations. Feeding the people struck by the disaster, managing house and dress need during disaster.	2
	Total	32

Practical

S.No.	Topic	No. of Lectures
1.	Visit to a local area to document environmental assets river/forest/grassland/hill/mountain,	4
2.	visit to a local polluted site Urban/rural/industrial/agricultural.	4
3.	Study of common plants, insects, birds and study of simple ecosystems i.e. pond, river, hill slopes, etc.	4
4.	Case studies.	4
	Total	16

Suggested Readings

- Bharucha, E. (2005). Text book of environmental studies. University Grants Commission, University Press, New Delhi.
- Kapur, A. (2005). Disasters in India: Studies of grim reality. Rawat publication, Jaipur.
- Chauhan, B.C. (2008). Environmental studies. University Science Press, New Delhi.
- De, A.K. (2010). Environmental chemistry. Willey Eastern ltd. New Delhi.
- Singh, S. and Singh, J. (2013). Disaster Management. Pravilika Publication Allahabad.

II-SEMESTER

FND 121

Food Service Management -I

3 (2+1)

Theory

S. No.	Topics	No .of Lectures
1.	Development and types of food service institutions, historical development	3
2.	Management, organization and administration of a food service establishment	4
3.	Organization of kitchen, storage and service areas, layout designs	3
4.	Equipments -Classification, selection, operation, purchasing, care and maintenance	3
5.	Food purchasing, receiving, storage, menu planning, food production and service	3
6.	Financial management -Cost concepts, food cost control, pricing, book-keeping, accounting	4
7.	Personnel management -Policies, recruitment, selection, facilities, benefits, trainings and development	3
8.	Sanitation, hygiene and safety in food service establishment	3
9.	Laws governing food service establishments, legal issues	3
10.	Current issues	3
	Total	32

Practical

S. No.	Experiments	No .of Practicals
1.	Practice in formal and informal table setting and table manners.	2
2.	Contribution of food service institutions in meeting socioeconomic and dietary needs .	2
3.	Menu planning for industrial canteen hospital canteen cafeteria snack bar residential hostel .	3
4.	Visit to canteen attached to hospital and dietary department cafeteria 3-star hotel/restaurant 5-star hotel /restaurant industrial canteen .	3
5.	Practical exercise on planning preparation and service in a cafeteria Snack bar fast food outlet.	3
6.	Presentation of report on hospital canteen cafeteria -star hotel /restaurant 5-star hotel/ restaurant in terms of organizational set up production, preparation and service .	3
	Total	16

Suggested readings

- Chakrabarty MM. 2003. Chemistry and Technology of Oils and Fats. Prentice Hall.
- Dendy DAV & Dobraszczyk BJ. 2001. Cereal and Cereal Products. Aspen.
- Hamilton RJ & Bhati A. 1980. Fats and Oils - Chemistry and Technology. App. Sci. Publ.
- Hosenev RS. 1994. Principles of Cereal Science and Technology. 2nd Ed. AACC.
- Kay DE. 1979. Food Legumes. Tropical Products Institute.
- Kent NL. 1983. Technology of Cereals. 4th Ed. Pergamon Press.
- Kulp K & Ponte GJ. 2000. Handbook of Cereal Science and Technology. 2nd Ed. Marcel Dekker.
- Lorenz KL. 1991. Handbook of Cereal Science and Technology. Marcel Dekker.
- Marshall WE & Wadsworth JI. 1994. Rice Science and Technology. Marcel Dekker.
- Mathews RH. 1989. Legumes Chemistry, Technology and Human Nutrition. Marcel Dekker.
- Matz SA. 1969. Cereal Science. AVI Publ.
- Paquot C. 1979. Standard Methods of Analysis of Oils, Fats and Derivatives. Pergamon Press.
- Pomeranz Y. 1987. Modern Cereal Science & Technology. VCH Publ.
- Salunkhe DK. 1992. World Oilseeds: Chemistry, Technology and Utilization. VNR. Swern D. 1964. Bailey's Industrial Oil and Fat Products
- Sethi and Malhan. (1993) Catering management: An integrated approach. Wiley Eastern.
- West, Wood and Hanger. Food Service in institutions. John Wiley and Sons, Inc. Hoboken, New Jersey.

FND 122

Nutritional Biochemistry -II

3 (2+1)

Theory

S. No.	Topic	No. of Lecture
1.	Water, electrolyte balance, Acid base balance .Ph And buffers .	3
2.	Enzymes -Definition types and classification of enzymes definition and types of coenzymes Cofactors specificity of enzymes Isozymes enzyme kinetics including factors affecting enzyme action velocity of enzyme catalyzed reactions enzyme inhibition.	2 2 2
3.	Introduction to nucleic acids-nitrogenous bases Nucleosides nucleotides Biosynthesis of DNA RNA –Structure Replication transcription and translation Genetic code regulation of gene expression	2 3 2
4.	Elementary knowledge of biosynthesis of proteins	2
5.	Vitamins -Chemistry and biochemical role of fat soluble vitamins - A DE and K	4 2

S. No.	Topic	No. of Lecture
6.	Water soluble vitamins –B1 B2 B6 niacin pantothenic acid B12 folic acid and vitamin C.	2 2
7.	Minerals: Calcium, iron, Magnesium, phosphorus, Sodium, potassium, iodine, fluorine.	3
8.	Trace minerals –zinc, copper, chromium, Selenium .Biochemical role of inorganic elements, Lead, Mercury, Arsenic, phosphorus, tin (in brief)	3
	Total	32

Practicals

S. No.	Experiment	No. of Practicals
1.	Preparation of buffers;	3
2.	Preparation of samples solutions: (% Vol/Vol, % Weight/Vol., Molar, Normal)	4
3.	Preparation of colloids	3
4.	Ph determination	3
5.	Preparation of emulsions	3
	Total	16

Suggested Reading

- West, E .S., Todd, W .R.; Mason .H.S .and Van Bruggen J.T :.4th Ed .Text book of biochemistry . Amerind Publishing Co .Pvt .Ltd .
- Murray, R .K .Grannen, D .K.; Mayes, P .A .and Rodwell .V .W :.Harper's biochemistry .Lange Medical Book.

FND 123

Food Processing and Packaging

3 (2+1)

Theory

S. No.	Topic	No. of Lectures
1.	Food processing and preservation techniques for cereals	2
2.	Food processing and preservation techniques for milk	2
3.	Food processing and preservation techniques for fruits and vegetables	2
4.	Food processing and preservation techniques for oilseeds	2
5.	Food processing and preservation techniques for legumes	3

S. No.	Topic	No. of Lectures
6.	Food processing and preservation techniques for meat	3
7.	Fish and poultry and their impact on physical and chemical characteristics. Physico chemical characteristics	3
8.	Nutritional quality and shelf life studies. Factors effecting quality of processed foods.	3
9.	Food packaging Package functions	3
10.	Requirement and packaging materials. Principles in the development of protective packaging. Laws related to packaging. Shelf-life of packed food	3
11.	Special problems in packaging of foodstuffs.	3
12.	Advances in Food packaging	3
	Total	32

Practical

S. No.	Experiments	No. of Practicals
1	Market survey for packaged processed food stuffs. Cereal cookery. Vegetable cookery: effect of heat and alkali on pigment	2 2 2
2	Preparation of soups	2
3	Salads and beverages. Use of milk and milk products in various preparations Use of egg in various preparations Estimation of shelf- life of packaged food stuffs.	2 2 2 2
	Total	16

Suggested Readings

- Potter, N.N. (1996). Food Science. The AVI Publishing Company, Inc., Westport, Connecticut.
- Kalia, M .and Sood, S. (2010). Food preservation and processing .Revised edition, Kalyani Publishers, New Delhi.
- Srilakshmi, B. (2010). Food Science (Fifth ed). New Age International Pvt .Limited, Pub., New Delhi.
- Frank, A., and Paine, H.Y. (2003). A Handbook of food packaging .Springer science and business Media, U.K.
- Gordon L .and Robertson. Food packaging-principles and applications, Marcel Dekka Inc, Newyork.

Theory

S. No.	Topic	No. of Lectures
1.	Overview of nutritional management vis-a-vis physical fitness, techniques and methods of measuring physical fitness	3
2.	Body composition -methods of measuring body composition - direct and indirect, Body composition in different physiological conditions and factors affecting it	3
3.	Energy metabolism and physical fitness- aerobic and anaerobic, concept, importance, influencing factors	3
4.	Techniques to measure energy expenditure and energy intake, Aging physiology, mechanism and role of nutrients in arresting aging process, aging theories, nutritional requirements of sports personnel involved in various sports, Basic exercise physiology and biochemistry -Physiological and metabolic changes during and after sports activity	4
5.	Macronutrients metabolism in exercise –carbohydrates problems and fat (Fueling before, during and after exercise)	3
6.	Effects of dehydration and rehydration in exercise and role of water and electrolytes in performance	3
7.	Vitamins metabolism in sports	3
8.	Free radicals in exercise role of antioxidants in exercise	3
9.	Minerals and trace minerals metabolism in exercise and essential minerals and trace minerals in sports	3
10.	Sports nutrition products, sports nutrition, theory to practice –,Special consideration in sports nutrition- Women, young, diabetic, vegetarian athletes, Sport specific nutrition –Gymnastics, weight lifters, skiers, cyclists, swimming, skating, ,Winning recipes for peak performance	4
	Total	32

Practical

S. No.	Topic	No. of Lectures
1.	Development of project proposal on nutrition in physical fitness	4
2.	Development of methodology for collection of data, assessment of nutritional status and physical fitness, practice of using anthropometry, clinical and dietary assessment techniques, assessment of body composition of the selected group	4
3.	Development and standardization of tool for physical fitness	2
4.	Assessment of physical fitness of the selected group using standard tool	2
5.	Compilation of data of anthropometry and clinical observation	2
6.	Analysis of dietary intake to assess the nutrient intake, interpretation of nutrient intake in comparison with RDA, compilation of data on energy expenditure, analysis of data and Final report writing of the project and presentation	2
	Total	16

Suggested Reading

- Falkner, F .and Tanner JM. (1978). Human growth -Principles and prenatal growth .Vol .I .
- Falkner, F .and Tarnner JM. (1980). Human growth methodology .Ecological, genetic and nutritional effects on growth .Vol .III .Plenum Press.
- Passmore, R .and Eastwood MA. (1986). Human nutrition and dietetics .ELBS Churchill Livngstone.
- Pike, R.L .and Brown ML. (1988). Nutrition -An Integrated Approach .John Wiley and Sons.

FND 125 Fruits and Vegetables : Preparation and Utilization-I 2 (1+1)

Theory

S. No.	Topic	No. of Lectures
1.	Importance and scope of fruits and vegetables in human diet	1
2.	Selection and purchase of fruits and vegetables for preservation	1
3.	Processing of fruits and vegetables Substances present in fruit and how they help in processing Overview of phytochemicals, antioxidants and value addition	3
4.	General principles involved in preservation of fruit and vegetables products	3
5.	Pickles, vinegar,	1
6.	Specifications of processed products	1
7.	Post- harvest practices and changes	2
8.	Alcoholic, non-alcoholic carbonatedbeverages and tea, coffee and cocoa products	2
9.	Fruit juice concentrates	1
10.	Wine and fermentation technology	1
	Total	16

Practical

S. No.	Topic	No. of Practicals
1.	Evaluation of pectin grade Preparation and quality evaluation of fruit jam with fruits of regional importance	1
2.	Preparation and quality evaluation of fruit jelly with fruits of regional importance.Evaluation of pectin grade	2
3.	Preparation and quality evaluation of fruit marmalade	1
4.	Preparation and quality evaluation of fruit preserve and candy	2
5.	Preparation and quality evaluation of squash / syrup/ fruit RTS	1

S. No.	Topic	No. of Practicals
6.	Preparation of grape raisin / dried fig / dried banana	1
7.	Processing of tomato products	2
8.	Preparation and evaluation of dehydrated vegetables/ dried ginger / mango powder (amchur)	1
9.	Preparation and quality evaluation of wafers with vegetables / tubers	1
10.	Preparation of pickle / mixed pickle	3
11.	Demonstration on Canning of mango guava papaya	1
	Total	16

Suggested Reading

- Barret DM, Somogyi LP and Ramaswamy H .2005 .Processing of Fruits .CRC Press
- FAO .2007 .Handling and Preservation of Fruits and Vegetables by Combined Methods for Rural Areas -Technical Manual .FAO Agr .Ser .Bull., 149.
- Fellows P .2007 .Guidelines for Small-Scale Fruit and Vegetables Processors .FAO Agr .Ser . Bull., 127.
- Kalia, M. and Sood, S. 2010. Food Preservation and Processing. Revised edition, Kalyani Publishers, New Delhi.
- Lal G, Siddappa GS and Tandon GL .1998 .Preservation of Fruits and Vegetables .ICAR.
- Salunkhe DK andKadam SS.1995 .Handbook of Fruit Science and Technology :Production, Composition and Processing .Marce
- Sivasankar, B .2002 .Food Processing and Preservation .PHI Learning Pvt .Ltd.
- Singh, I .S .2009 .Post harvesthandelling and processing of fruits and vegetables .Westville Publishing House, New Delhi.

FSN 121

Elementary Human Physiology

3 (2+1)

Theory

S. No.	Topics	No. of Lectures
1	Introduction to anatomy and physiology and structural organization of body	2
2	The cell –structure, its organelles, functions and multiplications, different types of cells and their functions, movement of particles across cell membrane -active transport and passive transport, body fluids and its compartments and functions	2
3	Water output and input into the body and maintenance of water balance in human body	2
4	The tissues –types, structure and their functions, the skeletal system -anatomy and functions, structure, formation and development of bones, different types of bones and types of joints and their movements	3
5	Skeletal system -anatomy and functions, structure, formation and development of bones, different types of bones and types of joints and their movements, muscular system	2

S. No.	Topics	No. of Lectures
6	Circulatory system -the blood -composition and function, blood clotting and blood grouping, heart -structure, functions, types of circulatory systems, blood pressure and heart rate and factors affecting it, electrocardiogram	3
7	The respiratory system -anatomy, functions, mechanism of breathing and respiratory volumes, gas transport and respiratory adaptation	2
8	The digestive system -anatomy and functions of alimentary tract and accessory organs, process of digestion of food, absorption and assimilation of digested food, enzymes involved in digestion of food .Functions of liver. Pancreas -structure and functions	3
9	The urinary system -anatomy and functions, formation and composition of urine	2
10	The endocrine system -important ductless glands of the body and their functions, locations and secretions	3
11	The reproductive system -male reproductive system -anatomy and functions, female reproductive system -anatomy and functions, menstrual cycle, estrous cycles, fertility test	3
12	The nervous system -elementary study of)anatomy and functions(Functions of brain and spinal cord .nerve impulse reflex action	3
13	Sensory organs -(anatomy and functions) Glossary of terms used in physiology	2
	Total	32

Practical

S. No.	Experiments	No. of Practical
1.	Demonstration of animal viscera. Identification of systems and organs Identification of cells -epithelial Muscle, skeletal system Nerveetc Transverse section of stomach Intestine -small and large demonstration of specimens of spleen Kidney and brain models of excretory and reproductive organs and their histology	2
2.	Estimation of RBC and WBC count by heamocytometer, Estimation of hemoglobin in mammalian blood, estimation of bleeding and clotting time and blood groups	3
3.	Demonstration of differential counting of WBC using peripheral smear, T.L.C . and D.L.C .PCV ESR, micro and macro heamatocrit	3
4.	Measurement of pulse rate and blood pressure Its variation with exercise, Heart beat and Heart sound	2
5.	Testing for sensation Special sensors Measurement of body temperature	3
6.	Demonstration/Estimation Respiratory quaoient Inspiration Expiration and measurement of O ₂ and CO ₂ at various partial pressure in lungs.	3
	Total	16

Suggested Readings

- Arthur J .Vanders .Human Physiology -The mechanisms of body function, Tata McGraw Hill Publishing Company, New Delhi.
- Samson Wright .Applied Physiology .10thedn .Revised by Keele, C.A .and Neil, B .Oxford University Press, New York.
- C .Guyton .Text Book of Medical Physiology .5thed .W.B .Saunders Company -Philadelphia, London.

Objectives

- To develop understanding regarding different forms of technical writing.
- To develop competence in technical writing.

Theory

S. No.	Topic	No. of Classes
1.	Technical writing- concept, importance and difference between technical and general writing	1
2.	Different forms of technical writing- Technical articles, Reports, Proposals, Technical correspondence	1
3.	Writing process - prewriting, drafting, rewriting and editing	1
4.	Preparation of manuscript- Introduction, Headings, writing a paragraph(Inductive, deductive, question to answer, exposition, time order, comparison and contrast, enumeration, space order), Conclusion, decimal system of numbering, abbreviation, Type size and style	2
5.	Technical articles- Source material, topic selection, literature review, tables, figures, footnotes, bibliography.	2
6.	Reports- Definition and characteristics, different types of report formats (Blank form, letter form, memorandum form and general survey report)	3
7.	Proposal writing- Definition and kinds of proposal, division of formal proposal (Front matter, letter of transmittal, title page, summary or abstract, table of contents, statement of request and body).	3
8	Technical correspondence- General principles of technical correspondence, parts of a letter (Heading, address, salutation, body, complimentary closing, signature), type of letters (letters giving instructions, inquiries and answers to inquiries, complaints and adjustments, letter urging action, applications and resumes).	3
	Total	16

Practical

S. No.	Topic	No. of Classes
1.	Writing a paragraph	3
2.	Writing manuscript and final draft of the following- <ul style="list-style-type: none"> • Technical report • Formal correspondence • Proposal • Technical articles 	3 3 4 3
	Total	16

Suggested Readings

- Strunk, Jr.; William and White, E.B. (1967). The elements of style. New York: Macmillan.
- Sherman, T.A. and Simon, S. J. (1990). Modern technical writing. New Jersey: Prentice-Hall.
- Alvarez, J.A. (1980). The elements of technical writing. New York: Harcourt.
- Krishnamohan and Banerjee, M. (1990). Developing Communication Skills. MacMillan India Ltd, New Delhi.

COMP 121

Agricultural Informatics

3(1+2)

Theory

S. No.	Topics	No. of Lectures
1.	Introduction to computers, anatomy of computers, memory concepts, units of memory, operating system, definition and types.	4
2.	Application of MS-Office for creating, editing and formatting a document, data presentation, tabulation and graph creation, statistical analysis, mathematical expressions.	4
3.	Database- Concepts and types, creating database, uses of DBMS in health and nutrition.	4
4.	Internet and World Wide Web (WWW)- Concepts, components and creation of web, HTML, XML coding.	4
	Total	16

Practical

S. No.	Topic	No. of Practical
1.	Study of computer components, accessories, practice of important DOS commands. Introduction of different operating systems such as windows, Unix, Linux, creating files and folders, file management.	5
2.	Use of MS-WORD and MS Powerpoint for creating, editing and presenting a scientific document, handling of tabular data, animation, video tools, art tool, graphics, template and designs.	6
3.	MS-EXCEL - Creating a spreadsheet, use of statistical tools, writing expressions, creating graphs, analysis of scientific data, handling macros.	6
4.	MS-ACCESS: Creating database, preparing queries and reports.	4
5.	Introduction to World Wide Web (WWW) and its components, creation of scientific website, presentation and management of health information through web.	4
6.	Use of smart phones and other devices for health warning signs and dietary management	4
7.	Hands on practice on preparation of decision support system.	3
	Total	32

Second Year B.Sc. (Honours) Food Nutrition and Dietetics

III-SEMESTER

FND 211

Fundamentals of Food Microbiology

3 (2+1)

Theory

S. No.	Topics	No. of Lectures
1	Basic aspects and scope of food microbiology; Intrinsic and extrinsic factors that affect microbial growth in foods	2
2	Microbial spoilage of Milk, fruits, fruit juices, vegetables, cereals, meat, poultry, sea foods, carbonated soft drinks, canned foods; chemical changes caused by microorganisms; control of spoilage	3
3	Food Fermentations, traditional fermented foods of India and other Asian countries Probiotics, prebiotics and synbiotics	3
4	Food preservation -Physical methods	2
5	Chemical preservatives and natural antimicrobial compounds, biology based preservation system	3
6	Control of microorganisms by use of low and high temperature, asepsis, water activity, drying, preservatives, radiation and pressure for control of microorganisms	3
7	Microbiology of milk and milk products; Sources of contamination, spoilage and prevention	2
8	Microbiology of fruits and vegetables	2
9	Cereal and cereal products	2
10	Meat and meat products	2
11	Fish and other sea foods	2
12	Poultry and eggs	2
13	Sugar and sugar products; salts and spices	2
14	Food poisoning caused by bacteria :Salmonella Staphylococcal poisoning Botulinum Clostridium perfringens and B.cerus .Sources incubation period mechanism of action.	2
	Total	32

Practical

S. No.	Experiments	No. of Practicals
1	General laboratory practices in microbiology laboratory	1
2	Equipment used in food microbiology laboratory	1
3	Aseptic methods	1
4	Sterilization methods	1
5	Morphological studies	1
6	Preparation of media	1

S. No.	Experiments	No. of Practicals
7	Isolation and enrichment of microorganisms	1
8	Microbial analysis of food products and water .	1
9	Isolation of molds from foods.	1
10	Microbial examination of :	
	Cereal and cereal products	1
	Vegetable and fruits	1
	Meat and meat products	1
	Fish and other sea foods	1
	Eggs and poultry	1
	Milk and milk products; sugar, salts and spices.	2
	Total	16

Suggested Readings

- Stanier Ingraham and Wheels and Painter .1992 .General Microbiology .5thed.
- Kapoor, T .and Yadav. 1991 .An Introduction to Microbiology.

FND 212

Principles of Human Nutrition

3 (2+1)

Theory

S. No.	Topic	No. of Lectures
1	Food groups, food guide pyramid and its importance, foods as a source of nutrients	1
2	Relationship of nutrition to health, growth and human welfare;	1
	Definitions of terms used in nutrition -Recommended dietary allowances; balanced diet; health; functional food; phytochemicals; nutraceuticals; dietary supplements	2
3	Energy -Units, sources and requirements, fuel value of foods,	2
	Methods of measuring energy value of food,	1
	Energy requirement of body, physical activity and thermogenic effect of food,	2
	BMR -methods of measurement, factors affecting BMR	1
4	Digestion and absorption of carbohydrates, fats and proteins	1
5	Carbohydrates -Types, functions, sources, requirement,	2
	health conditions affected by carbohydrates, Significance of dietary fibre	1
6	Lipids -Types, functions, sources, requirement,	1
	health problems associated with lipids	1
7	Proteins -types, functions, sources, requirement,	2
	quality evaluation, improvement,	1
	deficiency disorders and protein energy malnutrition	2

S . No.	Topic	No .of Lectures
8	Vitamins -Classification, functions, sources, requirement, deficiency and toxicity of the following -	1
	(i) Fat soluble vitamins-A, D, E, K;	2
	(ii) Water soluble vitamins –C,	1
	(iii) B Complex;thiamine, riboflavin, niacin, B2, B3 and folic acid	1
9	Minerals -Classification, functions, sources, requirements, deficiency and toxicity of calcium, phosphorus, iodine, fluorine, iron, bioavailability and factors affecting calcium and iron absorption	1
	Sodium, potassium, chloride, copper and zinc;	1
10	Water, Functions, sources, distribution in body	1
	water and electrolyte balance	1
	Total	32

Practicals

S . No.	Experiment	No .of Practicals
1	Serving size of common dishes	2
2	(a) Planning and preparation of nutrient rich dishes :protein, calcium, iron, vitamin A, thiamine, riboflavin, niacin and ascorbic acid. (b) Ccalculate calorie and cost of dishes prepared for above nutrients	6
3	Evaluation of three days energy balance	2
4	Planning and preparation of dishes based on simple processing techniques to improve bioavailability of nutrients.	
	Germination	1
	Fermentation	1
	Mutual supplementation	1
	Malting and others	1
5	Planning and preparation of low cost nutritious recipes	1
6	Study of common deficiency diseases through audio visual aids	1
	Total	16

Suggested Readings

- Agarwal, A and Udipi, S. 2014. Text Book of Human Nutrition .Jaypee Medical Publication, Delhi.
- Sehgal, S .and Raghuvanshi, R.S. 2007. Text Book of Community Nutrition .ICAR Publication.
- Khanna, K .Gupta, S .and Seth, R .1999 .Text Book of Nutrition and Dietetics .Phoenix Publishing house Pvt .Ltd., New Delhi .
- Gopalan, C .Ramasastry, B .V .and Balasubramanian, S.C., 1998 .Revised and updated by Rao, B.S.N., Deosthale, Y.G .and Pant, K.C .Nutritive value of Indian Foods .NIN, Hyderabad, India .
- NIN .2010 .A .Manual, Dietary Guidelines for Indian and National Institute of Nutrition, Hyderabad .
- Krause, M .V .and Mahan, L .K .2004 .Food; Nutrition & Diet Therapy .WB .Sunders Co .Philadelphia .
- Robinson, C .H .and Lawler, M.R .1986 .Normal and Therapeutic Nutrition .Mc -Millan Co., New York .
- Swaminathan, M.S .1985 .Advanced Text Book on Food and Nutrition .Vol .I and II .The Bangalore Printing and Publishing Co, Ltd .Bangalore .

S. No.	Topics	No. of Lecture
1.	Indian and global scenario on food production and processing	1
2.	Quality requirement of raw material for processing plants	1
3.	Primary processing secondary processing -storage changes in grains	2
4.	Food spoilage-causes and factors effecting, chemical nature	1
5.	Principle and methods of food preservation -drying and dehydration, use of high temperature, use of salt, use of sugar, use of low temperature, preservative-food material as preservatives, use of chemicals, radiation, combination of above methods-changes in constituents, preservation by concentration, recent methods in preservation	3 1
6.	Effect of food processing and preservation on the nutritive value of foods	2
7.	Traditional methods of storage and preservation, food flavours, importance of storage of semi perishable and nonperishable foods	2
8.	Packaging and packaging material	2
9.	Labeling and costing of the product	1
	Total	16

Practical

S.No.	Experiment	No. of Practicals
1	Market survey of raw and preserved foods	3
2	Preparation of preserved products :Squash, Cordial, Crush	3 3 3
3	Jams, jellies, marmalade, Candy, preserves, murabbas, syrup	2+2+2 2+2+2+1
4	Pickles with and without oil, chutneys,	2+2+1
5	Candies, toffees, cheese	2+2+1
6	Ketchup, Sauces,	2 2
7	Shelf life and sensory evaluation of developed products Demonstration on canning and bottling of fruits and vegetables	3 2
8	Demonstration on storage of food grains	2
9	Visit to food processing and preservation units, canning and bottling units, grain storage institute dairy plant and FCI godown	2
	Total	48

Suggested Readings

- Potter, N.N. 1996. Food Science .The AVI Publishing Company, Inc., Westport, Connecticut.
- Sehgal, S., Grewal, R.B., Kawatra, A .and Kaur, Y. 1997. Practical Aspects of Food Preservation. Directorate of Publications. Haryana Agricultural University, Hisar.
- Vijay K., 1999, Text book of Food, Storage and Preservation, Kalyani Publishers, New Dehi.
- Kalia, M .and Sood, S. 2010. Food Preservation and Processing .Revised Edition, Kalyani Publishers, New Delhi .
- Jood, S .and Khetarpaul, N. 2002. Food Preservation .GeetaSomaniAgrotech Publishing Academy, Udaipur.
- Sivasankar, B. 2002. Food Processing and Preservation .PHI Learning Pvt .Ltd .Delhi.

FND 214

Bakery and Confectionary

4 (2+2)

Theory

S. No.	Topic	No .of Lectures
1.	Introduction to baking science .Basic materials used in bakery and confectionery Selection, properties and functions.	2
2.	Flours -constituents functions and characteristics of good flour and tests . Different types of flour mixtures used bakery and confectionery	2
3.	Egg structure composition and its functions in bakery and confectionery . Different types of fats and oils used in bakery and confectionery and their functions .	2
4.	Sugars and functions and types of sugars used in bakery and confectionery cooking of sugar and its stages	2
5.	Leavening agents used in bakery and confectionery and their functions liquids and moisturizing agents used in bakery and confectionery and their functions . Salt and its functions in bakery and confectionery and their functions	2
6.	Yeast and types of yeast used in bakery and confectionery and their functions . Biscuits and cookies -basic ingredients required and their functions	2
7.	Improvers and emulsifiers used in bakery and confectionery and their functions.	2
8.	Techniques in preparation of biscuits and cookies and different types of biscuits and cookies faults and remedies in biscuit and cookies preparation	2
9.	Color flavoring and related products used in bakery and confectionery .Cakes - Types of cakes ingredients required and their role in cake preparation .	2
10.	Balancing a cake formula, characteristics of good cake -external and internal characteristics faults and remedies in cakes preparation	2
11.	Gelling, whipping agents and related products used bakery and confectionery	2

S. No.	Topic	No .of Lectures
12.	Bread –Ingredients required in bread preparation and their functions steps involved in preparation of bread,	2
13.	Different methods of bread preparation .Characteristics of good bread -External and internal characteristics bread diseases and preventive measures -Rope and mold-causes and preventionFaults and remedies in bread preparation	2
14.	Icing –Types of icing and ingredients used in icing and their role gumsPastry making, principles and various derivatives jellies-introductionprocessing treatments	2
15.	Tools and techniques used in bakery equipment used in bakery caramel	2
16.	Toffee and fondant-introduction ingredients structure of toffee formulations texture of toffee and fudge quality control of bakery products.	2
	Total	32

Practical

S . No.	Experiment	No .of Practicals
1.	Use of different bakery equipment balancing the formula for bakery products	2
2.	Demonstration on standard method of making different types of biscuits salt	3
3.	Cocoanut and fruit biscuits	2
4.	Demonstration on standard method of making different types of cookies	3
5.	Preparation of different types of cookies	2
6.	Plain sponge cake	2
7.	Chocolate cake	2
8.	Pineapple upside down cake	2
9.	Eggless cakes and muffins walnut cake	2
10.	Madiera cake	2
11.	Fruit/plum cake	2
12.	Carrot cake	2
13.	Demonstration on standard method of making of pastries	2
14.	Pastries	2
15.	Icings and cake decoration.	2
	Total	32

Suggested Readings

- Edmund, B .B .and James, steward .Cake Making, G.S T .Bamford, Leonard Hill Book, London.
- Peter R .W .Biscuit manufacture -Fundamentals of Online Production .Elsevier Publishers.
- Fance, W.J and Wragg, BH .Up-to -date bread making, Maclaren and Sons, London.

Theory

S. No.	Topics	No. of Lectures
1.	Food uses of major pulses- Bengal gramgreen gram Black gramredgramlentilsetc.	3
2.	Primary processing of pulses- Cleaning dryingStorage, control of storage pests. Secondary processing methods-Dehullingsmall scale processinglarge scale processing.	4
3.	Traditional dal mills and modern dal mills nutrient losses during processing. Different methods for removal of anti-nutrients	3
4.	Processing methods of pulses like soaking, germination Cooking fermentation etc.	3
5.	Major oilseeds produced in India and their utility- groundnut rapeseed/ mustard soybean sesame seed sunflower safflower cottonseed linseed castor.	4
6.	Pretreatments and oil extraction from different oilseeds. Refining bleaching deodorization	3
7.	Hydrogenation processes of edible oils Anti-nutritional factors and toxic constituents of pulses and oilseeds. Methods of removing antinutrients.	4 1
8.	Technology of production of oilseed meals/flours	3
9.	Protein concentrates and isolates of pulses and oilseeds and their utilization. By product utilization of pulses and oilseeds.	3 1
	Total	32

Practical

S. No.	Experiment	No. of Practicals
1.	Visit to traditional <i>dal</i> mills	1
2.	Modern <i>dal</i> mills	1
3.	Oil mills to expose students to <i>dal</i> milling operations and oil extraction operations.	3
4.	Demonstrations on soaking and Dehulling Germination Fermentation methods Analysis of antinutrients- Phytic acid, saponins, trypsin inhibitors etc.	3 2
5.	Preparation of snacks based on pulses and oilseeds. Preparation of recipes based on germinated and fermented pulses.	3 3
	Total	16

Suggested Readings

- Khader, V .Text Book of Food science and technology .Directorate of information and publications of agriculture, ICAR, KrishiAnusandhan Bhawan, Pusa, New Delhi.
- Srilakshmi B. 2010. Food Science .New Age International Pvt .Ltd .New Delhi.
- Salunkhe, D .and Despande, S.S .foods of plant origin :Production, technology and human nutrition .The AVI Publishings Inc.New York .
- Kalia,M and Sood S. 2010, Food preservation and processing .Kalyani Publishers, Ludhiana.
- Potty, V.H .and Mulky, M.J .Food processing .Oxford and IBH.

FND 216

Food Toxicology

2 (2+0)

Theory

S. No.	Topic	No. of Lectures
1.	Introduction and significance of food toxicology	4
2.	Food poisoning –Types, causative factors, signs and symptoms, preventive measures	4
3.	Natural food toxins – Anti-nutritional factors, other food toxins, their harmful effects and methods of removal	6
4.	Microbial toxins and food intoxication – Source of contamination, effect on health, preventive measures, methods of inactivation / destruction	6
5.	Chemical toxins – Pesticides, insecticides, metallic and others, residual effects, preventive measures, methods of removal	6
6.	Food packaging material – Potential contaminants from food packaging material	6
	Total	32

Suggested Reading

- Kramer and Kramer 1984 Nutritional toxicology Vol I and II.
- Fennamma, O.R. 1996 Food chemistry.

STAT- 211

Elementary Statistics

3(2+1)

Theory

S. No.	Topic	No. of Classes
1.	Introduction to statistics: definitions, functions, uses and limitations.	1
2.	Classification and tabulation of data: qualitative and quantitative classification, discrete and continuous variables, frequency tables, grouped and ungrouped data.	2
3.	Diagrammatic representation of data: One and Two dimensional diagrams with applications.	2
4.	Graphical representation of data: Histogram, frequency polygon, frequency curve, ogives.	2

S. No.	Topic	No. of Classes
5.	Measures of central tendency: Introduction to basic concepts of logarithms, AM, GM, HM, median, mode with merits, demerits and uses, relationship between AM, GM and HM,	3
6.	Measures of dispersion: range coefficients, inter quartile range, quartile deviation, deciles, coefficient of quartile deviation, mean deviation from AM, median and mode, variance, standard deviation, coefficient variation.	4
7.	Moments: Raw moments, Central moments for grouped and ungrouped data, relationship between raw moments and central moments.	3
8.	Measures of skewness and kurtosis: definitions of symmetrical distribution, skewness and kurtosis, relationship between mean, median and mode and between quartiles for symmetrical and skewed distributions.	3
9.	Correlation and linear regression analysis: definition of correlation its types, scatter diagrams, Karl Pearson's formula of correlation coefficients, properties of correlation coefficient, definition of regression, regression equations of Y on X and of X on Y, relationship between correlation coefficient and regression coefficients. Problems based on correlation and regression	4
10.	Tests of significance: basic definitions, hypothesis, null and alternative hypothesis, tests statistic, testing of hypothesis, one sample t-test and two sample fisher's t-test. Chi-square test of goodness of fit and Chi-square test of independence of attributes.	4
11.	Introduction to sampling methods: definition of population, random sample, sampling versus complete enumeration, use of random number table for	4
	Total	32

Practicals

S. No.	Practical	No. of Practicals
1.	Graphical representation of data (Histogram, frequency polygon, frequency curve, ogives)	1
2.	Measures of central tendency (AM,GM,HM, median, mode for Grouped and Ungrouped data)	2
3.	Measures of dispersion (Range, mean deviation, standard deviation, quartile deviation, coefficient of variation for Grouped and Ungrouped data) with calculation of quartiles, deciles and percentiles.	3
4.	Measures of skewness and kurtosis (Grouped and Ungrouped data), moments.	2
5.	Correlation and regression analysis	2
6.	Application of one sample t-test , Application of two sample t-test	2
7.	Chi-square test of goodness of fit ,Chi-square test of independence of attributes	2
8.	Selection of random sample using simple random sampling	2
	Total	16

Suggested Readings

- Elhance, D. N. Fundamentals of Statistics
- Agarwal, B. L. Basic Statistics
- Kapoor and Saxena Mathematical Statistics
- Singh and Verma Agricultural Statistics
- Hall and KniGHT Higher Algebra

IV-SEMESTER

FND 221

Normal Nutrition and Meal Planning

4 (2+2)

Theory

S. No.	Topic	No. of Lectures
1.	Basic principles of menu planning, planning menus for individual and family	2
2.	Food groups and their use in meal planning	2
3.	Recommended dietary allowances of macro and micro nutrients for different age groups. Factors affecting food requirements of individuals, families and different groups of people	2 2 2
4.	Factors influencing food intake and food habits, Classification of vegetarianism	1
5.	Importance of balanced diets.Steps involved in meal planning physiological and psychological factors affecting the diet plan	2 2
6.	Food exchange list. Use of food exchange list in diet planning, planning breakfast, lunch, tea, dinner, packed lunch and snacks; considering RDA for individuals	2 2 2
7.	Food and nutrient requirement of adults (male and female of all activities level), pregnant women, lactating women,	2 2
8.	Infants and normal infants .Breast feeding, advantages of breast feeding, prelacteal feeding, breast feeding during illness, feeding of pre term baby, feeding problems. Weaning and complementary feeding-	2 1
9.	Food and nutrient requirement of pre-school children, school age children, adolescents, age people	2 2
	Total	32

Practical

S. No.	Experiment	No. of Practicals
1.	Standardization of serving sizes, Portion, Cost of locally available common foods	4 4 4
2.	Planning preparation and nutrient calculation of diets of preschool children, School going children, Adolescents and Adults	4 4 4 4
3.	Packed lunches for school children	2
4.	Meal planning and preparation for special occasions	2
	Total	32

Suggested Readings

- Robinson and Weicley, 1984. Basic Nutrition and diet Therapy .Macmillian Publishing Co .Inc . New York and London.
- Gopalan, C., Ramsastri, B.V .and Balasubramanian, S.C. 1990. Nutritive Value of Indian Foods.
- ICMR, 2010. Recommended Dietary allowance for Indians, ICMR, Delhi.
- Srilakshmi, B. 2002 Nutrition science, New age Int .Ltd .Pub., New Delhi
- Joshi, S. 2000. Nutrition and dietetics .Tata McGraw-Hill Publishing Co .Ltd., New Delhi.
- Sharma S. 2006. Human nutrition and meal planning .Delhi, Jnanada Prakasham)PandD .(Mudambi, S .R .and Rajagopal M.V. 2001. Fundamentals of foods and nutrition .New Delhi, New Age International)P (Ltd .New Delhi.

FND 222

Nutrition Through Life Cycle

3 (2+1)

Theory

S. No.	Topics	No. of Lectures
1.	Infancy- nutrient requirement during infancy, feeding of infants, value of breast feeding on infants, breast feeding versus artificial feeding, types of milk and their use in infant feeding	2
	Role of nutrition on physical and mental development, rate of growth-weight as an indicator, assessment of growth,	3
2.	feeding of premature and low-birth-weight infants	2
3.	Nutritional disorders and common ailments in infancy, feeding the sick child, immunization schedule and growth charts	3
4.	Preschool age: Physical growth and mental development,	2
	prevalence of malnutrition in preschool years and food habits, nutritional requirements during preschool age and supplementary foods.	3
5.	School age :Physical growth and mental development, nutritional requirements during school age, specific problems, specific problems in feeding school children	2
6.	Adolescence: Physical and physiological changes, nutritional requirements, food preferences and nutritional problems, growth spurt and nutrition, adolescent fads influencing nutrition	2
7.	Adulthood, Sex, occupation and income, nutritional requirements, biological and nutritional consequences and complications due to pollutants, vegetarianism	2
8.	Nutrition, wok capacity and physical fitness	2
9.	Nutrition, infection and immunity,	1
10.	Pregnancy: Physiological changes in pregnancy, weight gain during pregnancy, food and nutrient requirements. Complications of pregnancy and their nutritional management,	2
	Impact of nutrition on the outcome of pregnancy. Nutritional need of fetus during different stages of fetal cell growth and maternal nutritional needs	2

S. No.	Topics	No. of Lectures
11.	Psycho-physiology of lactation; milk synthesis and secretion, maternal needs during lactation, composition of colostrums and mature human milk, milk of mothers of pre-term babies. Non-nutritional factors of human milk; immunological factors, enzymes, hormones. Human milk banking	2
12.	Elderly: Physical and physiological changes, nutritional requirements, problems of old age, nutrients influencing aging process	2
	Total	32

Practicals

S. No.	Topics	No. of Lectures
1.	Grouping of foods based on richness of nutrients and quantifying foods to give uniform content of each nutrient	2
2.	Planning and formulation of food exchange lists	2
3.	Planning, preparation and evaluation of diet for adult men and women involved in different activities	4
4.	Planning, preparation and evaluation of diets for pregnant women, lactating mothers, weaning and supplementary foods for infants, preschool children, school going children, packed lunches for preschoolers and school children, adolescent boys and girls, elderly, preschool children with pem and	4
5.	Vitamin A deficiency Planning diets for anaemic children, adolescents and pregnant women	4
	Total	16

Suggested Reading

- Moris, E.S. (1994). Modern nutrition in health and disease .Leaned Febin.ger, USA
- Srilakshmi, B. (1995). Dietetics .Newage international publishers, New Delhi.
- Corinne H.R, Marilyn R .L, Wanda L .C and E. Garwick (1982). Normal and therapeutic nutrition) .pp -1-16 .(New York, Macmillan Publishing Company.
- Williams, S.R.; Worthington, R.S.; Sneholinka, E.D.; Pipes, P.; Ress, J.M .and Mahal, K.L. (1988). Introduction to nutrition throughout the life cycle .Times Mirroe/Mosby College Publishers.

FND 223

Food Product Developmet and Formulations

4 (2+2)

Theory

S. No.	Topics	No. of Lectures
1.	Basic principles of food product development.	2
2.	Objective methods of product evaluation Advances in techniques of product development	3
3.	Sensory properties of food and their role in product development.	3

S. No.	Topics	No. of Lectures
4.	Bulk food preparation for food institutions and enterprises: Servings, nutritive value and costing.	3
5.	Evaluation of food: Objective and subjective methods, selection and training of judges.	3
6.	Development of score cards and analysis of data.	3
7.	Consumer evaluation: development of schedule and data analysis.	3
8.	Sensory evaluation of product Food security in food product development	3
9.	Packaging materials and labeling.	3
10.	Food safety and quality control issues in product development.	3
11.	Food quality regulations and standards, quality control and HACCP Product formulation and development for general and therapeutic use.	3
	Total	32

Practical

S. No.	Topics	No. of Lectures
1.	Sensory evaluation: Methods, training of judges, score card preparation	3
2.	Selection and modification of food products to be developed,	3
3.	Formulation and standardization of products, objective and subjective evaluation of the products <ul style="list-style-type: none"> • Snacks • Fermented foods • Curries and gravies • Continental dishes • Baked foods 	3 2 2 2 2
4.	Evaluation of consumer acceptability,	3
5.	Cost calculation, packaging and sale of products	4
6.	Presentation of developed food products,	3
7.	A.V. aids/ Video shooting of product preparation	3
	Total	32

Suggested Readings

- Altschul A., M) .1993 .(Low calorie foods .Marcel Dekker .
- Goldberg, I) .1994 .(Functional foods :Designer foods, Pharma Foods, Nutraceuticals .Springer .
- Matz, S.A) .2004 .(Formulating and processing of dietetic foods .CHIPS Publ .
- Kalia, M. and Sood, S. (2010). Food preservation and processing. Revised edition, Kalyani Publishers, New Delhi.
- Srilakshmi, B) .2010 .(Food science)Fifth ed (.New Age International Pvt .Limited, Pub., New Delhi .

Theory

S. No.	Topic	No. of Lectures
1.	Properties of foods. Solubility Vapour pressure, Boiling point, Freezing point, Osmotic pressure, Viscosity, Surface tension, Specific gravity	3
2.	Oxidation and reduction. Acids Bases and buffers. Chemical bonding, Ionic bond, Covalent bond, Polar and nonpolar molecules	3
3.	Hydrogen bond Colloids Sols Gels Emulsions and foams.	3
4.	Composition of foods- classification Structure and properties of carbohydrates	3
5.	Proteins	4
6.	Lipids. Water - physical problem	3
7.	Free Adsorbed and bound water;	3
8.	Properties of minerals and vitamins	3
9.	Pigments. Structure and properties of chlorophyll Anthocyanins Flavanoids Tannins Betalains Quinones Carotenoids	4
10.	Myoglobin and haemoglobin. Flavour compounds Terpenoids Flavanoids Sulphur compounds and volatile flavour compounds.	4
11.	Enzymatic browning Enzymes in food processing Classification, composition and effect of processing of fruits and vegetables. Structure, composition, processing and effects on composition of cereals, pulses and oilseeds- Composition, processing and changes in processing of milk, eggs, meat and poultry	3
12.	Sugars and sweeteners Reaction of sugars, Non-nutritive sweeteners.	3
13.	Food additives: Antioxidants Chelating agents Coloring agents Curing agents Emulsions Flavorsome flavour enhancers Humectants and anti-caking agents	3
14.	Nutrient supplements	3
15.	Stabilizers Thickeners.	3
	Total	48

Practical

S. No.	Experiment	No. of Practicals
1.	Basic measurements- Temperature volume Weight density and specific gravity	2
2.	Weight and volume of food stuffs- Flours sugar Fat eggs.	2
3.	Measurement of pH by pH meter and by indicators acid base and and oxidation – Reduction titrations and freezing point.	2

S. No.	Experiment	No. of Practicals
4.	Effect of kind and quantity of solutes on boiling point. Osmotic principles in fruits..	2
5.	Flour paste chocolates sucrose starch and jelly.	2
6.	Qualities of flour: Absorptive power gluten and effect of other ingredients on gluten. Crystalization of sugars from syrups.	2
7.	Tests for unsaturation and rancidity of fats: Iodine value acid value saponification value peroxide value kreis testTBA number smoke point.	2
8.	Effect of heat on proteins.	2
	Total	16

Suggested Readings

- Manay, N.S .and Shadaksharswamy, M) .2001 .(Food facts and principles, II Ed . .New Age International)P(Ltd .Publishers, New Delhi.
- Aurand, L.W .and Woods A.E) .1973 .(Food chemistry .The AVI Publishing Company, Inc., Westport Connecticut.
- Mondy, N.) .1980.(Experimental food chemistry .AVI Publishing Company, Inc .Westport Connecticut

FND 225

Food Standards and Quality Control

3 (2+1)

Theory

S. No.	Topics	No .of Practicals
1	Food quality and quality attributes -Classification of quality attributes and their role in food quality, objectives, importance and functions of quality control, principles of quality assurance, quality assessment of raw materials.	3
2	International standards, Specifications and application of food standards for raw materials and food products .Grading and marking standards and specification for finished products.	3
3	Food laws and regulations, Prevention of Food Adulteration Act, Fruit Product Order, Agmark, Essential Commodity Act, Consumer Protection Act, Bureau of Indian Standards, Codex Standards, FSSAI.	3 1
4	Food additives, introduction and importance, classification of preservatives, colouring agents, emulsifying and stabilizing agents, leavening agents and antioxidants.	3
5	Various methods / techniques for the assessment of quality of different foods, instrumental analysis of quality control. Different ways of testing texture of different foods.	3
6	Food adulteration -introduction and various ways of adulteration.	2

S. No.	Topics	No .of Practicals
7	Introduction to sensory analysis, general testing conditions, requirements of sensory laboratory, organizing sensory evaluation programme, selection of sensory panelists.	3
8	Factors influencing sensory measurements, Sensory quality parameters –Size, shape, texture, aroma, taste, color and gloss, threshold and dilution tests, different tests for sensory evaluation– discrimination, descriptive, affective, flavour profile and tests, ranking tests, methods of sensory evaluation of their food products.	3
9	Food safety and quality control Food grade standards for different processed products.	3
10	Food safety, risks and hazards. Assessment and prevention of food adulteration. Food packaging and packaging material, Labelling of food products	5
	Total	32

Practical

S . No.	Experiment	No .of Practicals
1	Sampling techniques for collection of agriculture, horticulture and animal foods .	2
2	Collection of food samples from different sources.	1
3	Physical examination and grading of grains, spices etc for quality.	2
4	Exercise on identification of basic taste sweet, sour, salty and bitter, triangle test, Sensory evaluation techniques, duo trio test, score card method, Sensory evaluation of a food product.	2
5	Demonstration of objective tests for quality evaluation, Detection of food adulteration in grain samples and spices, oils and milk,	2
6	Collection of food products with artificial colouring and checking for quality.	2
7	Visit to quality control laboratory /food processing industries and note the procedures and parameters used for quality assessment	3
8	Market Survey and Preparation of Scrap Book.	2
	Total	16

Suggested Readings

- Potter, N.N. (1996). Food Science. The AVI Publishing Company Inc., Westport, Connecticut.
- Jellinek, G. (1985). Sensory Evaluation of Foods :Theory and Practice .Ellis Honwood Ltd . Chichester, England.
- Manual of Food Standards and Quality Control. (2014). Dept .of Foods and Nutrition, CCS HAU, Hisar.
- Swaminathan, M. (1999). Food Science, Chemistry and Experimental Foods .2nded .The Bangalore Printing and Publishing Co., Bangalore.
- Many, N.S .and Shadaksharswamy, M. (1996). Food Facts and Principles .2nded .New Age International Pvt .Limited, New Delhi.
- Kalia, M .and Sood, S. (2010). Food Preservation and Processing. Revised edn .Kalyani Publishers, New Delhi.

Objectives

- To orient students about communication skills.
- To strengthen the communication skills to be effective in presenting one self.
- To help the students in understanding and enhancing their personality.

Theory

S. No.	Course title	No. of Classes
1.	Communication skills-Concept	2
2.	Process of communication - A. Verbal communication: <ul style="list-style-type: none"> • Listening and note taking • Oral presentation skills • Reading and comprehension of general and technical articles • Individual and group presentations • Impromptu presentation • Public speaking • Group discussion B. Non Verbal communication : 1. Field Diary and lab record 2. Writing skills 3. Precise writing 4. Summarizing 5. Abstracting	1 1 1 1 1 1 1 1 1 1 1
3.	Role of ICT in communication	1
4.	Recent advances in communication- <ul style="list-style-type: none"> • Print and electronic • Internet • E-mail, fax • Mobile • Interactive video and teleconferencing • Computer • E-governance 	1 1 1 1 1 1 1
5.	Meaning and definition of personality	1
6.	Theoretical perspectives on personality- <ul style="list-style-type: none"> • Behavioral trait and personality pattern, molding the personality pattern • Emotional Intelligence • Transactional Analysis 	1 1 1

S. No.	Course title	No. of Classes
7.	Personality development- <ul style="list-style-type: none"> • Self perception • Self concept • Self esteem and gender stereotyping • Persistence and changes in personality determinants (physical, intellectual, emotional, social, educational and family). 	1 1 1 1
8.	Aspirations, achievements and fulfillment	1
9.	Presenting oneself for formal and informal occasions	1
	Total	32

Practical

S. No.	Course title	No. of Classes
1.	<ul style="list-style-type: none"> • Listening and note taking, writing skills • Oral presentation skills • Field diary and lab record • Indexing • Footnote and bibliographic procedures 	1 1 1 1 1
2.	<ul style="list-style-type: none"> • Reading and comprehension of general and technical articles • Precise writing • Summarizing • Abstracting • Individual and group presentations 	1 1 1 1 1
3.	Developing questionnaire to study impact of physique, educational Status, aspirations on personality	1
4.	Developing questionnaire to study social prescriptions, aspirations, achievements, gender and family on personality	2
5.	Collecting data, Report writing and presentation	2
6.	Practicing for Group Discussion and Interview	1
	Total	16

Suggested Reading

- Stewart, W. 2002. Building self-esteem. Lacio Publishing House. New Delhi.
- Thomas, A. and Harrisen. 1973. I'm O.K. - You're O.K. Pan Books, London.
- Berk, L.E. (1993). Infants, children and adolescents. Allyn and Bacon, Baston.

Third Year B.Sc. (Honours) Food Nutrition and Dietetics

V-SEMESTER

FND 311

Introduction to Clinical Nutrition

4 (3+1)

Theory

S . No.	Topics	No. of Lectures
1.	Clinical Nutrition -Introduction nutritional status and disease common deficiency diseases	4
2.	Pathogenesis of nutritional deficiency Metabolic changes and clinical diagnosis in various diseases .Metabolic changes and clinical diagnosis in degenerative diseases :Diabetes Cardiovascular diseases Renal disorder liver diseases cancer	4 4
3.	Interpretation of report of blood and urine in different disease conditions .Drug and nutrient interaction effect of drugs on nutritional status .Effect of diet and nutritional status on drug effectiveness.	4 4
4.	Gastro intestinal tract diseases -Introduction different organs and diseases diagnostic procedure diseases of mouth and oesophagus diseases of stomach and duodenum diseases of small and large intestine diverticulitis malabsorptive syndrome and tropical sprue pancreatitis	6 6
5.	Lipo and apo proteins role of nutrients in preventing atherosclerosis	4
6.	Chronic obstructive pulmonary disease major enzymes used for diagnosis Hypertension .Burns .Physical destruction of skin metabolic aberrations	4 4
7.	Alteration in nutritional requirement interaction between nutrients infection and drugs.	4
	Total	48

Practicals

S . No.	Topics	No. of Lectures
1.	Identification and interpretation of clinical signs of nutritional deficiency diseases sampling of blood and urine for nutritional status estimation of hemoglobin.	2
2.	Estimation of glucose in blood and urine in normal and diabetic persons.	2
3.	Estimation of RBC counts by haemocytometer estimation of WBC count by haemocytometer differential counting of WBC using peripheral smear Estimation of PCV ESR micro and macro heamatocrit	2

S. No.	Topics	No. of Lectures
4.	Estimation of bleeding and clotting time and blood groups measurement of pulse rate and blood pressure its variation with exercise testing for sensation special sensors measurement of body temperature diurnal variations.	2 2
5.	Visit to Clinical Lab for Demonstrations of lipid profile testing and serum retinol and albumin Demo on Estimation of ketone bodies creatinine and creatine in urine . Determination of bile pigments in urine Analysis of bile salts in urine.	2 2 2
	Total	16

Suggested Readings

- Lee, R.D .and Nieman, D.C) .1993 .(Nutritional assessment .Pub .Brown and Benchmark, USA.
- Pathak, N.N) .1997 .(Analytical techniques in clinical nutrition)manual(; Centre of Advanced Studies in animal nutrition IVRI, Izatnagar.
- Oser, B.L) .1979 .(Hawk's physiological chemistry .Tata Mc Graw Hill Pub .Co .Ltd., New Delhi.
- American Journal of Clinical Nutrition.

FND 312

Therapeutic Nutrition –I

4 (2+2)

Theory

S. No.	Topic	No. of Lectures
1.	Importance of therapeutic meal planning and factors to be considered in meal planning . Use of food groups and exchange list in therapeutic meal planning. Importance and modification of normal diet to therapeutic diets – Nutrients Consistency temperature	3
2.	Methods of feeding (normal and artificial) – Oral Enteral Parenteral feeding.	3
3.	Causes symptoms and dietary management in various nutritional deficiencies – Energy Protein	3
4.	Infections and fevers: Types causes Symptoms and dietary management in acute and chronic fevers	3
5.	Gastrointestinal disorders: Diarrhoea constipation Peptic ulcers GERD Ulcerative colitis Diverticulitis Irritable bowel disease	4

S. No.	Topic	No. of Lectures
6.	Malabsorption syndrome. Liver and gall bladder diseases – Causes Symptoms and dietary management of Jaundice Hepatitis Cirrhosis Ascites Hepatic coma Cholelithiasis.	3
7.	Eating disorders – Anorexia nervosa Bulimia Underweight	3
8.	Overweight and obesity and problems of weight control. Inborn errors of metabolism and their dietary management and Physical changes during this disorder	3
9.	Antioxidant Free radical scavenging activity How Antioxidant and phytochemical Functional food helpful for the degenerative disease or Non-Communicable disease.	3
10.	Inborn errors of metabolism and their dietary management and Physical changes change's during this disorder Antioxidant, free radical scavenging activity, How antioxidants and phytochemical, functional food helpful for the degenerative disease or Non- Communicable diseases	4
	Total	32

Practical

S. No.	Experiment	No. of Practicals
1.	Market survey for determining cost of locally available common foods; Standardization of serving sizes for different food items Portioning. Planning and preparation of soft and liquid diets	2 2 2
2.	ORS and bland diet and therapeutic diets for typhoid Tuberculosis Influenza Malaria and aids.	2 2 2
3.	Planning and preparation of diets for gastrointestinal disorders i.e. Diarrhoeaconstipation Peptic ulcers Gerd Ulcerative colitis Diverticulitis Irritable bowel disease	2 1 1 1 1 1 1

S. No.	Experiment	No. of Practicals
4.	Malabsorption syndrome. Planning and preparation of diets for liver and gall bladder diseases i.e. Jaundice Hepatitis Cirrhosis Ascites Hepatic coma and cholelithiasis and	2 2 1 1 1 1
5.	Eating disorders i.e. Anorexia nervosa bulimia Underweight Overweight and obesity and problems of weight control.	2 2
	Total	32

Suggested Readings

- Antia, P) .1986 .(Clinical dietetics and nutrition .Oxford Univ .Bombay.
- Moris, E.S) .1994 .(Modern nutrition in health and disease .Leander febiger, USA.
- Srilakshmi, B) .1995 .(Dietetics .New age international publishers, New Delhi.
- Corinne H .Robinson, Marilyn R .Lawler, Wanda L .Chenoweth, Ann E .Garwick) .1982 .(Normal and Therapeutic Nutrition) .pp -1-16 .(New York, Macmillan Publishing Company.
- Elia, M., Ljungqvist, O., Stratton, R. and Susan, L.)Eds) .(2012 .(Clinical Nutrition, 2nd Edition. Wiley-Blackwell
- Gopalan, C., Ramsastri, B.V .and Balasubramanian, S.C) .2012 .(Nutritive value of Indian foods.
- ICMR) .2010 .(Recommended Dietary Allowances for Indians, ICMR, Delhi.
- Joshi, S) .2000 .(Nutrition and dietetics .Tata McGraw-Hill Publishing Co .Ltd., New Delhi.

FND 313

Food Hygiene and Sanitation

2 (1+1)

Theory

S. No.	Topics	No. of Practicals
1	Meaning, Principle, Concept and significance of hygiene and sanitation in relation to food industry .	1
2	Water Requirement and use, sources of water supply, water pollution, purification of water, portable water and its quality-Criteria and standards, hardness of water and its treatment, defluoridation of water, Domestic and Industrial .Food and water borne infections .Prevention and control .Regulatory laws -Environmental pollution -Sanitary regulations and standards.	3

S . No.	Topics	No .of Practicals
3	Food storage general guidelines and storage of specific foods .principles of hygiene and sanitation -sanitary procedures while preparation, cooking, and holding food, serving and displaying food, specific food operations.	2
4	Food hygiene :Contamination of foods from various sources Green plants and fruits, animals, sewage, soil, air and water and their health hazards	2
5	Food spoilage :causes of spoilage of Perishable, semi perishable and non perishable foods	2
6	Personal hygiene and food handling habits of personnel Sanitary procedures for preparation, handling and storage of foods.	2
8	Food poisoning caused by bacteria : <i>Salmonella</i> , <i>Staphylococcal poisoning</i> , <i>Botulinum</i> , <i>Clostridium perfringens</i> and <i>Bcerus</i> , Sources, incubation period, mechanism of action	2
9	Food Poisoning, prevention and control, Food Poisoning caused by agents other than microorganism, Poisonous plants, animals, chemicals, metals and pesticides etc.	2
	Total	16

Practical

S . No.	Experiments	No .of Practicals
1	Drawing and labeling of structures of common microorganism in food for identification	3
2	Demonstration on preparation of slides, preparation of media	3
3	Collection of water samples .Demonstration on testing of water for (i) Physical quality (ii) Bacteriological quality	3
4	Survey of hygienic and sanitary condition in food shops/food vendors	2
5	Visit to Food Industries	3
6	Report writing	2
	Total	16

Suggested Readings

- Adams M.K .and Moss M.O) .2000 .(Food Microbiology, New Delhi :Panima Corp.
- Longree K.L .and Blaker G.C) .1982 .(Sanitary Techniques in Food Service .New York :John Wiley and Sons.
- Park, K) .1997 .(Textbook of Preventive and Social Medicine .1st Ed .Jabalpur :BanarsidasBhanot.

Theory

S. No.	Topics	No. of Lectures
1	Basic concept of community nutrition role of nutritionist in improving nutrition in community	2
2	Major nutritional problems prevalent in India and the state, Iron deficiency anaemia, Vitamin A deficiency, Iodine deficiency disorders, Calcium and vitamin D deficiency Flourine deficiency and toxicity	1 2 1 1 2
3	Malnutrition -Definition and causes, PEM, Marasmus, Kwasiorkor, vicious cycle of malnutrition	3
4	Assessment of nutritional status :Clinical signs and symptoms, Nutritional anthropometry, Growth monitoring Biochemical tests, biophysical tests, Diet survey methods Understanding of Z tables	3 2 1 2 2 1
5	National programmes and policies, role of national and international agencies in improving nutritional status of the community, Integrated Child Development Service)ICDS(, supplementary Nutrition Program)SNP(, Applied Nutrition Program)ANP(, Mid Day Meal Program)MDMP(, Vitamin A Prophylaxis Program, Anaemia Prophylaxis Programme, Food and Agricultural Organization)FAO(, World Health Organization)WHO(, United Nations Children's Fund)UNICEF(, UNDP, CARE and other Voluntary and Government Agencies	3 3
6	Nutrition education -Objectives, principles and importance of nutrition education in a community .	3
	Total	32

Practical

S. No	Experiments	No. of Practicals
1.	Assessment of nutritional status of an individual/community using anthropometry and dietary survey A) Preparation of schedule B) Survey work C) Analysis of data D) Writing of report ADDED	2 2 2 2

S. No	Experiments	No. of Practicals
2.	Visit to local health centre to identify clinical signs and symptoms of nutritional problems . Inferences to identify nutritional problems	1
3.	Visit to an ICDS Block, Anganwadi centers and evaluation of feeding provided at these centers.	1
4.	Preparation and use of instructional material -radio script; Charts, posters, calendars, flipcharts, popular article; pamphlets .	2
5.	Practicing use of nutrition education material on vulnerable groups in the community, rural and urban	1
6.	Planning, implementation and evaluation of nutrition education for a target group	3
	Total	16

Suggested Readings

- Potter, N.N .and Hotchkiss, J.H .1997 .Food Science .CBS Publication, New Delhi.
- Srilakshmi, S .2003 Food Science .3rded .New Age International)P (Ltd .Publication.
- Kalia, M .2002 .Food Analysis and Quality Control .Kalyani Publication, Ludhiana, India
- VijayaKhader 2001 .Text Book of Food Science and Technology, ICAR.
- Swaminathan M .1995 .Food Science, Chemistry and Experimental Foods .Bangalou Printing and Publishing Co.
- Jacob M .Safe Food Handling -A Training Guide for Managers, WHO, Geneva.
- Sehgal, S. and Raghuvanshi, R.S) .2007 (Text Book of Community Nutrition .ICAR, New Delhi

FND 315

Nutrition Education

3 (1+2)

Theory

S. No.	Topic	No. of Lectures
1.	Goals and history of public health nutrition.	2
2.	Objectives, principles and importance of nutrition education in a community.	2
3.	Deficiency diseases and public health problems-Vit. A, iron and iodine deficiencies, other micronutrient deficiencies.	2
4.	Identification of nutritional problems and target groups. Nutritional surveys, National Nutrition Monitoring Bureau.	2
5.	Communication techniques: Process, its components. Communication techniques: Mass, group and individual; advantages and disadvantages.	2
6.	Theory and practice of audio-visual teaching. Learning by doing, learning by observation, symbolic experience. Classification and use of audio visual aid-Electronic aid, non projected and three dimensional. Selection and evaluation of audio visual aids.	2
7.	Nutrition education: Planning effective programmes for target groups, developing appropriate messages.	2
	Total	16

Practical

S. No.	Experiment	No. of Practicals
1.	Preparation and use of instructional material- <ul style="list-style-type: none">• Charts,• posters,• calendars,• flipcharts,• pamphlets	1 1 1 1 1
2.	Practicing use of nutrition education material on vulnerable groups in the community, rural and urban	6
3.	Evaluation of nutrition education programmes executed	8
4.	Assessment of nutritional status: Techniques employed for-height, weight, body mass index, skin fold measurements	2 2
5.	Inferences to identify nutritional problems	9
	Total	32

Suggested Readings

- Obert, J.C. (1986). Community nutrition. Macmillan Publishing Co., N.Y.
- Reddy, A.A. (2001). Extension education. Sree Lakshmi Press, Bapatla.
- Ray, G.L. (1991). Extension communication and management. Naya Prokash, Kolkata.
- Rathore, O.S.; Chauhan, M.S; Dhakar, S.D. and Ojha, S.N. (2001). Handbook of extension education. Agrotech Publishing Academy, Udaipur.
- Dale, E. Audio-visual methods in teaching. The Dryden Press. Latest edition.

RMCS -312

Economics and Marketing

3(2+1)

Objectives

- To understand the role of Societies, governments, businesses, households, and individuals in allocating their scarce resources for governing economic activities of the country.
- To develop marketing skills in the context of economic activities performed.

Theory

S. No.	Topic	No. of Classes
1.	Terms and definitions in Economics	2
2.	Consumption, demand and supply.	2
3.	Factors affecting production.	2
4.	Gross Domestic Product (GDP).	2

S. No.	Topic	No. of Classes
5.	Marketing: <ul style="list-style-type: none"> • Definition • Marketing process • Need for marketing • Role of marketing • Marketing functions • Classification of markets • Marketing of various channels • Price spread 	1 1 1 1 1 1 1 1
6.	Marketing efficiency, integration	3
7.	Constraints in marketing of agricultural produce,	3
8.	Market intelligence, bank norms, insurance,	3
9.	SWOT analysis,	2
10.	Crisis management.	3
11.	Techno-economic parameters for preparation of projects and basic guidelines for preparation of project report.	2
	Total	32

Practical

S. No.	Topic	No. of Classes
1.	Techno-economic parameters for preparation of project.	3
2.	Preparation of bankable projects for various agricultural products and its value added products.	3
3.	Identification of marketing channel,	2
4.	Calculation of price spread	2
5.	Identification of market structure	3
6.	Visit to different markets.	3
	Total	16

Suggested Readings

- Ahuja, H. L. 2000 Modern Microeconomics – Theory and application. S. Chand and Company Ltd., New Delhi.
- Dewett, K. and Verma J. D. 2005. Elementary Economic Theory: S. Chand & Co. New Delhi.
- Gross, I. H. Crandall, E. W. and Knoll, M. M. 1995. Management for Modern Families. Prentice Hall, Inc. New Delhi.
- Kaur, S. Lekhi, R. K. and Singh, J. 2001. Consumer Economics, Kalyani Publisher, New Delhi.
- Kotler P. 2004. Marketing Management. Eleventh Edition. Pearson Education (Singapore) Pvt. Ltd. Indian Branch Patpargang, Delhi.
- Nickell, P. and Dorsey J. 2002. Management in Family Living. John Willey and Sons, New York.
- Seetharaman, P. and Sethi, M. 2002. Consumerism Strategies and Tactics, CBS Publishers & Distributors, New Delhi.
- Sherlekar, S. A. 2004. Marketing Management. Himalaya Publishing House, Mumbai.

Objectives

- To develop understanding about sociological concepts with special reference to rural community.
- To understand factors of social transformation and planned social change

Theory

S. No.	Topic	No. of Classes
1.	Sociology and rural sociology – meaning & significance.	2
2.	Difference between rural, urban and tribal community	3
3.	Indian rural social stratification <ul style="list-style-type: none"> • Caste & Class – Concept, characteristics and difference • Changes in social stratification and its role in economy & Policy. • Backward classes and implementation of constitutional provisions 	3 3 2
4.	Indian rural institutions <ul style="list-style-type: none"> • Social – Family & Marriage • Economic • Political 	3 3 3
5.	Rural poverty- Meaning & Causes.	2
6.	Religion- Concept, beliefs, traditions and customs	3
7.	Rural social change- <ul style="list-style-type: none"> • Concept, process and factors of transformation. • Planned social change. 	3 2
	Total	32

References

- Chitambar, J.B. (1973). Introductory rural sociology. New York, John Wiley and Sons.
- Desai, A.R. (1978). Rural sociology in India. Bombay, Popular Prakashan, 5th Rev. ed.
- Doshi, S.L. (2007). Rural sociology. Delhi Rawat Publishers.
- Jayapalan, N. (2002). Rural sociology. New Delhi, Altanic Publishers.
- Sharma, K.L. (1997). Rural society in India. Delhi, Rawat Publishers
- Sachdeva, D. R. and Bhushan, V. (2007). An Introduction to Sociology. Kitab Mahal Agency.

VI-SEMESTER

FND 321

Therapeutic Nutrition-II

3 (2+1)

Theory

S. No.	Topic	No. of Lectures
1.	Principles and objectives of therapeutic diets.	2
2.	Cardiovascular diseases- Causes symptoms and dietary management in atherosclerosis and hypertension myocardial infarction cerebrovascular stroke congestive heart failure.	2 2 2
3.	Diabetes mellitus and gout- TypescausesSymptoms and dietary management.	3
4.	Renal disorders – Physiology of kidney; causes symptoms and dietary management in nephrosisnephritisacute and chronic renal failurerenal calculi; dialysis.	3 3
5.	Respiratory disorders – Acute and chronic COPD acute respiratory disorders.	3
6.	Cancer- Causes symptoms and dietary management.	3
7.	Dietitian – Definition role and responsibilities of a dietitiancode of ethics Competencies of dietitian. Management of dietetics department	3
8.	Guidelines and requirements for establishing a diet counseling centre	3
9.	Techniques for diet counselingstages of change in behavior.	3
	Total	32

Practical

S. No.	Experiment	No. of Practicals
1.	Planning and preparation of diets for patients suffering from atherosclerosis	1
2.	Hypertension Myocardial infarction Cerebrovascular stroke Congestive heart failure	1 1 1 1
3.	Different types of diabetes mellitus	2
4.	Gout.	1
5.	Planning and preparation of diets for renal disorders i.e. Nephrosis Nephritis	2
6.	Acute and chronic renal failureRenal calculi	1
7.	Respiratory disorders – Acute and chronic COPD	1
8.	Acute respiratory disorders.	1
9.	Setting up a unit for nutrition counseling.	1
10.	Role play exercises for counseling.	2
	Total	16

Suggested Readings

- Antia,P) .1986 .(Clinical dietetics and nutrition .Oxford univ .Bombay.
- Moris,E.S) .1994 .(Modern nutrition in health and disease .Leaned febiger, USA.
- Srilakshmi, B) .1995 .(Dietetics .New age international publishers, New Delhi.
- Corinne H .Robinson, Marilyn R .Lawler, Wanda L .Chenoweth, Ann E .Garwick) .1982 .(Normal and Therapeutic Nutrition) .pp -1-16 .(New York, Macmillan Publishing Company.

FND 322

Nutraceuticals and Health Foods

3 (2+1)

Theory

S . No.	Topics	No .of Lectures
1	Introduction, relationship between nutraceuticals, foods and medicines	3
2	Definition of nutraceuticals and functional foods, synonymous terms i e .bioactive compound, phytochemicals, classification of nutraceutical substances based on food sources and based on mechanism of action, labeling and health claims	4
3	Regulatory issues for nutraceuticals including national and international standards	3
4	Nutraceuticals :Need, Potential health benefits of major nutraceuticals, omega-3, lycopene, isoflavonoids, prebiotics and probiotics, glucosamine, phytosterols etc, metabolism and bioavailability of nutraceuticals .	4
5	Concept of angiogenesis, nutraceuticals for joint heath, cardiovascular diseases, cancer, diabetes, obesity, eye health, cholesterol management .mental health	3
6	Therapeutic use of nutraceuticals and functional foods	3
7	Safety aspects of functional foods, Analytical techniques, Quality of nutraceuticals	3
8	Computer-aided sensory evaluation of food and beverage, statistical analysis of sensory and objective analysis data.	
9	Consumer studies and different types of consumer studies, implementation in food industry.	
10	Nutraceutical Stability, Concerns and shelf life testing	3
11	Regulatory aspects of functional foods, Legal aspects of functional foods	3
12	Current research in functional foods	3
	Total	32

Practical

S.No.	Experiments	No. of Practicals
1	Market survey for dietetic foods Exploratory study for available nutraceuticals and health foods and their claims.	2
2	Preparation & standardization of nutraceuticals and health foods for a disease / condition, /Planning, preparation, nutrient calculation and acceptability of dietetic foods with preference to locally available food stuff	2
3	Preparation of food : <ul style="list-style-type: none"> • High/low energy, • high/low protein • high/low fibre • low sodium, low cholesterol • low glycemic index, low fluid, • high fibre and low fat 	5
4	RUTF)Ready to use therapeutic foods (for under nutrition in preschool and school age children	1
5	Food for sports person in intensive activities and endurance activities Sensory evaluation, estimation of bioactive compound)s (and shelf life stability of developed products	3
6	Food for lactose intolerance, celiac disease, Food for senior citizens)with dental problem, with flatulence, digestive disorders, physical and nervous diseases	3
	Total	16

Suggested Reading

- Brigelius-F., J .and JoostHG) .2006 .(Nutritional Genomics :Impact on Health and Disease .Wiley VCH.
- Cupp, J .and Tracy, T.S) .2003 .(Dietary Supplements :Toxicology and Clinical Pharmacology . Humana Press.
- Gibson, G.R .and William CM) .2000 .(Functional Foods -Concept to Product.
- Goldberg I) .1994 .(Functional Foods :Designer Foods, Pharma Foods .1sted .Springer US
- Losso, J.N) .2007 .(Angi-angiogenic Functional and Medicinal Foods .CRC Press.
- Manson, P).2001 .(Dietary Supplements .2nded .Pharmaceutical Press.
- Campbell J.E .and Summers JL) .2004 .(Dietary Supplement Labelling Compliance.
- Neeser, J.R .and German BJ) .2004 .(Bioprocesses and Biotechnology for Nutraceuticals . Chapman and Hall.
- Robert, E.C) .2006 .(Handbook of Nutraceuticals and Functional Foods .2ndedn .Wildman.
- Shi J) .2006 .(Functional Food Ingredients and Nutraceuticals :Processing Technologies .CRC Press.
- Robert .E.C) .2002 .(Hand book of Neutraceuticals and Functional Foods, CRC, Press.
- Goldber, I) .1999 .(Functional foods :Designer foods, Pharma foods and Nutraceuticals, An Aspen Publications.
- Ghosh, D., BaghchiDebasis and Konishi Tetsuya .2014 .Clinical Aspects of Functional Foods, CRC Press.

Theory

S. No.	Topics	No. of Practicals
1.	Development of meat industry	4
2.	Meat byproduct utilization	4
3.	Pre-slaughter operations of meat animals and poultry birds	4
4.	Structure, composition, nutritive value, postmortem changes and eating quality of meat tissues	4
5.	Principles of various preservation techniques like chilling, freezing, curing, smoking, thermal processing, canning and irradiation	4
6.	Meat cutting and packaging	3
7.	Microbial and other deteriorative changes in meat and their identification	3
8.	Standards and quality control measures adopted for meat and meat products in India and abroad	4
9.	Principles of preparation of different meat products	4
10.	Meat food products order, meat regulations under FSSAI, eating quality of meat, sensory evaluation of meat food products	4
11.	Fraudulent substitution of meat and its recognition	3
12.	Organic meat, value added meat products	4
13.	Texturized vegetable proteins/Meat substitutes and analogues, Vegetarian meats	3
	Total	48

Suggested Readings

- Forrest, J.C., Aberle E.D., Harlod B.H., Max D.J., Robert A.M. 1975.
- Principles of meat science, W.H. Freeman and Company, San Francisco.
- Sharma B.D).2005.(meat and meat production technology)including poultry production technology.(Jaypee Brothers Medical Publishers)P(Ltd).New Delhi.

Theory

S. No.	Topic	No. of Lectures
1.	Introduction to food analysis- definition Reasons for food analysis Official methods	1
2.	Rules and regulation for food analysis and importance of food analysis in quality control	1
3.	Sample and sampling techniques	1
4.	Familiarization to terms and calculations used in preparation of various standard solutions	2
5.	Principles techniques and applications of colorimetric and spectrophotometer	1
6.	Analysis of carbohydrates- introduction Methods of analysis Sample preparation	2
7.	Extraction of monosaccharide'soligosaccharides Chemical methods for carbohydrates analysis gravimetric methods Titremetric methods and colorimetric methods enzymatic methods	2
8.	Analysis of polysaccharides- starch Crude fiber and dietary fiber	2
9.	Analysis of moisture importance of moisture analysis– methods of analysis direct methods Evaporationmethods Analysis of moisture - indirect methods Chemical and distillation methods Analysis of moisture – instrumental methods	2
10.	Analysis of proteins– importance of protein analysis Protein analysis by Kjeldhal Dumas Biuret Lowry Dyebinding Turbid and UV visible spectroscopy methods	2
11.	Analysis of amino acids- Characterization	1
12.	Basic principles of chromatography	1
13.	Types of chromatography and its applications	1
14.	Paper and GLC chromatography Analysis of fats- by solvent Non-solvent and instrumental methods	1
15.	Analysis of composition fats and its physical parameters	1
16.	Analysis of antinutritional factors- characterization Basic principles -tannins Phytates Oxalates etc.	2
17.	Principles Techniques and applications of HPLC TLC	1
18.	Analysis of ash- introduction and importance Dryashing Wet ashing and low plasma temperature ashing	1
19.	Analysis of different minerals by gravimetric and titration methods	2
20.	Principles Techniques and applications of AAS and AES	1
21.	PH meter	1
22.	Electrophoresis	1
23.	Introduction to animal assay.	1
24.	Principles Techniques and applications of colour estimating instruments.	1
	Total	32

Practical

S. No.	Experiment	No. of Practicals
1.	Introduction to glassware's used in laboratory	1
2.	Preparation of samples and preparation of solutions buffers	2
3.	Estimation of moisture in food stuffs	1
4.	Estimation of bulk density of foods	1
5.	Estimation of colour using spectrophotometer	1
6.	Physical analysis-specific gravity	1
7.	Quantitative estimation of proximate principles- Ash Minerals Free fatty acids Protein	2
8.	Estimation of sugars-reducing and non-reducing	2
9.	Estimation of starch digestibility	2
10.	Estimation of vitamins by use of colorimetry	2
11.	Estimation of minerals by use of UV spectrophotometer	2
12.	Estimation of amino acids by use of paper chromatography	2
13.	Estimation of vitamins by use of HPLC	2
14.	Estimation of fatty acids and pesticide residues by use of GC	2
15.	Estimation of minerals by use of atomic absorption spectrophotometer	2
16.	Quantitative estimation of minerals and vitamins by use of photofluorometry	2
17.	Analysis of antinutrients- Phytic acid Saponins Trypsin inhibitors etc.	3
	Total	32

Suggested Reading

- AOAC)1995 .(Association of official analytical chemists .Washington, DC.
- Gruenwedels DW and whitakor JR)1984 .(Food analysis :Principles and techniques .Vols .I-VIII . Marcel Dekker.
- Joslyn MA) .1970 .(Methods in food analysis :Physical, chemical and instrumental Methods of analysis .academic Press.
- Pomeranz Y and Molean CE) .1977 .(Food analysis theory and practice .AVIPubl.
- Sawhney SK and Singh R) .2000 .(Introductory practical biochemistry .Narosa.

Theory

S. No.	Topics	No .of Lectures
1.	Genomics – scope and importance Definition	3
2.	Global impact of genomics; genomics in agriculture and environment	4
3.	Application of genomics in development of nutritious foods .	3
4.	Single cell protein;	3
5.	Nutritional significance of food products developed by biotechnological techniques; Scientific Technological and resource constraints on genomics; Important factors affecting development in nutria genomics . Overview of genomics in agriculture & environment	4 4 3
6.	Nutritional genomics -definition Concept Scope Applications Regulatory issues	3 3
7.	Nutrigenetics and Personalized Nutrition	3
8.	Genetically modified foods -Development Advances, Health concerns Regulatory issues Ethical concerns of genetic engineering	4 3 3 2
	Total	48

Suggested Readings

- Nestle M .2003 .Safe Food :Bacteria, Biotechnology and Bioterrorism .University of California Press.
- Rogers PL and Fleet GH .1989 .Biotechnology and Food Industry .Univ .of Minnesota.

Theory

S. No.	Topics	No. of Lectures
1.	Scope of public health. Goals and history of public health nutrition	1
2.	The basic concept of health, health as a human right, national health and nutritional policy	2
3.	Public health problems of India, nutrient deficiency and other diseases, their etiology, prevalence and prevention	2

S. No.	Topics	No. of Lectures
4.	Mortality and morbidity pattern of vulnerable groups and their causes.	1
5.	Nutritional needs of normal infants, prelacteal feeding, exclusive breast feeding, feeding of full term and premature infants. supplementary foods in combating malnutrition in infants and young children . Existing picture of child health, objective and imaginative approach to child care	3
6.	Identification of nutritional problems and target groups. Nutritional surveys, National Nutrition Monitoring Bureau.	2
7.	National programmes relevant for public health: Vitamin A deficiency disorder control programme National diarrhoeal disease programme, National iodine deficiency Disorder control programme, iron deficiency anemia prophylaxis programme National malaria eradication programme, national immunization programme, national programme for control of tuberculosis, national leprosy eradication programme, national aids control programme, national guinea worm eradication programme, national kala azar control programme, other health and nutrition programmes.	
8.	Gaps between the government policies and their benefits to the population. Factors affecting implementation of programmes in rural areas. Importance of Surveillance systems and NFHS	3
9.		1
10.	Modulating factors in nutrition for public health	2
11.	Special care and priority for mentally handicapped	2
12.	Occupational health and industrial health policy	3
13.	Vegetarianism, Traditional medicine, health food,	3
14.	Genetically modified foods and their relevance in human health	2
15.	Epidemiology as a basis of health policy	1
	Total	48

Practical

S. No.	Experiments	No. of Practicals
1.	Epidemiological approach to study individual disease in a community	6
2.	Analysis of data and report writing	4
3.	Discussion for preventive and therapeutic strategies	2
4.	Public health campaign in a village	4
	Total	16

Suggested Readings

- Mukhopadhyay, A) .1992 .(State of India's health .Voluntary Health Association of India.
- Srilakshmi, B).2002 .(Nutrition science .New Age International)P(Limited.
- McLaren, D.S) .1976 .(Nutrition in the community .John Wiley and Sons, London.
- DeMaeyer, E.M) .1989 .(Preventing and controlling iron deficiency anaemia through primary health care .A guide for health administrators and programme managers .WHO, Geneva.
- WHO 2001 .Assessment of iodine deficiency disorders and monitoring their elimination .A guide for programme managers 2nded.
- Meashan, A.R .and Chatterjee, M) .1999 .(Wasting Away :The crisis of malnutrition in India . The World Bank, Washington, D.C.
- Krishnaswamy, K) .2000 .(Twenty five years of National Nutrition Monitoring Bureau .NIN, Indian Council of Medical Research, Hyderabad.

FND 327

Nutrition in Emergencies

2 (2+0)

Theory

S. No.	Topics	No. of Lectures
1.	Definition and historical perspective of national emergencies	1
2.	Starvation in emergencies arising out of drought, floods, earth quakes, war wrong policies and properties	3
3.	Effect of short, medium and long term emergencies on food and nutrients, intake, Major nutritional deficiency diseases in emergency	3
4.	Food needs at national level during normal emergencies, precautions against food shortage	3
5.	Mobilization of local resources; general fund distribution, mass and supplementary feeding, therapeutic feeding, social funds	3
6.	Control of communicable diseases, public health and hygiene problems during Emergencies	3
	Total	32

Suggested Readings

- Messer E, Mark J, Cohen C and Jashinta D. 1998. Food from Peace:
- Breaking the Links between Conflicts and Hunger. IFPRI, Washington.
- Spark A. 2007. Nutrition in Public Health: Principles, Policies and Practice. CRC Press.
- WHO, 2000 The Management of Nutrition in Major Emergencies..

Fourth Year B.Sc. (Honours) Food Nutrition and Dietetics

VII-SEMESTER

FND 411 Fruits and Vegetables : Preparation and Utilization-II 2 (0+2)

Practical

S. No.	Experiments	No. of Practicals
1	Grading, selection and preparation of fruits and vegetables for preservation	4
2	Preparation of various fruits, vegetables and related products	16
3	Canning and hot packing of fruit and vegetable products	8
4	Visit to fruit and vegetable processing industries.	4
	Total	32

Suggested readings

- Kalia, M. and Sood, S. (2010). Food preservation and processing. Revised edition, Kalyani Publishers, New Delhi .
- Sivasankar, B) .2002 .(Food processing and preservation .PHI Learning Pvt .Ltd.
- Singh, I .S) .2009 .(Post harvest handelling and processing of fruits and vegetables .Westville Publishing House, New Delhi.

FND 412 Nutritional Status Assessment Methods 3 (0+3)

Practical

S. No.	Experiments	No. of Practicals
1	Assessment of nutritional status of community	6
	dietary surveys,	6
	clinical, surveys,	6
	anthropometric measurements	6
	-Data collection, tabulation, interpretation	6
	report writing.	6
	Target group selection from local hospitals suffering from nutritional deficiencies, tabulation, interpretation and report writing of their tested biomarkers.	6
	Total	48

Suggested Readings

- Sehgal S .and Raghuvanshi R.S. 2007. Textbook of community nutrition Directorate of Information and Publications of Agriculture, Indian Council of Agricultural Research, New Delhi.
- Latham M.C. 1997. Human nutrition in the developing world .Food and Agricultural Organization of United Nations.
- Srilakshmi, B. 2012. Nutrition science, New age international pvt .Ltd .Publishers .New Delhi.
- Srilakshmi, B. 2012. Dietetics, New age international pvt .Ltd .Publishers .New Delhi.
- Dahiya, S., Boora, P .and Rani, V. 2013. A manual on Community Nutrition, Department of Foods and Nutrition, published under ICAR Assistance scheme.
- Bamji, S.M., Rao, N.P .and Reddy, V. 1996. Textbook of human nutrition .Oxford and IBH publishing Co .Pvt .Ltd., New Delhi.
- Swaminathan, M. 1985. Essential of food and nutrition .2nd edition, Vol .II .The Bangalore printing and publishing company Ltd .Bangalore.

FND 413

Food Service Management –II

3 (0+3)

Practical

S. No.	Experiments	No. of Practicals
1.	Introduction to quantity food production, familiarization to equipment for quantity food production, standardization of recipes – procedure	4
2.	Practical exercise on standardization of recipe, multiplication of standard recipe, portioning and cost calculation	4
3.	Standardization of recipes suitable for different catering services	8
4.	Cafeterias /canteens, snack bars, industrial canteens, residential hostels	4
5.	Costing of recipes planned and fixing the price	4
6.	Exercise on quantity food production for different type of food service establishments	4
7.	Visit to residential hostel, hospital canteen, industrial canteen, star hotel and fast food centre to observe the organization, management and administration	4
8.	Making a detailed project report for establishing a food service unit including making purchase documents for equipment purchase and tenders etc	4
9.	Organizing and planning menu for college canteen as a catering enterprise, setting up of a canteen, management of college canteen - procurement of materials	4
10.	Practical exercise on food preparation, pricing and sale	4
11.	Preparation and presentation of report on management of canteen	4
	Total	48

Suggested reading

- Fuller J .1966 .Chefs Manual and a Kitchen Management .B.T .Badtsford Ltd.
- Sethi M &Malhan S .1997 .Catering Management -An Integral Approach .New Age International.
- Treat N & Richards 1997 .Quantity Cookery .Little Brown & Co.
- West BB, Wood L, Harger VF &Shugart GS .1977 .Food Service in Institutions, John Wiley & Sons.

FND 414

Diet and Nutrition Counseling

3 (0+3)

Practical

S. No.	Experiments	No. of Practicals
1.	Self assessment of role as a dietitian – Pre-test on role, summary of competencies, preparation of self confidence checklist and post test on self role	3
2.	Preparation of SOAP notes based on case studies and group discussion	2
3.	Preparation of overweight and underweight fact list handout and development of counseling guidelines for weight loss and weight gain	2
4.	Weight loss counseling – Use of role play technique, workshop for patients at obesity clinic	2
5.	Visit to hospitals with therapeutic kitchen setup	2
6.	Diabetic diet counseling at diet and nutrition counseling centre, diabetic clinics, diabetic diet exhibition in collaboration with hospitals for the benefit of public, development of dietary fat facts list, cholesterol facts list, sodium facts list, Development of dietary counseling tips for different cardiovascular disorder and counseling; cardiac patients using role play technique, presentation in specialty hospital (CVD for patients as well as attendants)	6
7.	Diet exhibition on cardiovascular disorders in a specialty hospital / general hospital, preparation of handouts on ulcer facts list, high fibre facts list, low residue facts list, low lactose facts list, counseling for patients suffering from diarrhoea, constipation, colitis, diverticulosis and ulcer	6
8.	Preparation of SOAP notes and gall bladder facts list handout and counseling a patient of gall stones	4
9.	Preparation of liver disease facts list handout, collection of case history of patient suffering from hepatitis, cirrhosis of liver, alcoholics	2
10.	Counseling the patient and conducting group discussion	2
11.	Preparation of kidney disease facts list handout and development of counseling tips for kidney disorders, dietary counseling in a specialty hospital/diet and nutrition counseling centre for kidney disorder and diet exhibition for kidney disorder	4

S. No.	Experiments	No. of Practicals
12.	Preparation of cancer facts list handout, Preparation of list of parenteral and enteral products available in the market for use during counseling	3
13.	Setting up a unit for nutrition counseling	6
14.	Role play exercises for counseling	2
15.	Supervised counseling of patients/clients	2
	Total	48

Suggested Readings

- Antia, P. 1986. Clinical dietetics and nutrition .Oxford univ .Bombay.
- Moris, E.S. 1994. Modern nutrition in health and disease .Leaned febiger, USA.
- Srilakshmi, B. 1995. Dietetics. New age international publishers, New Delhi.
- Corinne H .Robinson, Marilyn R .Lawler, Wanda L .Chenoweth, Ann E.Garwick. 1982. Normal and Therapeutic Nutrition. pp -1-16. New York, Macmillan Publishing Company.

FND 415

Special Project

4 (0+4)

Practical

S. No.	Experiments	No. of Practicals
1.	Preparation of an assignment and accessing information. The student will submit a 3,500 word assignment. The assignment will consist of a product description under the headings: Food formulation, manufacturing process, quality control, nutritional value, packaging, distribution and marketing, financial management, Floor planning and layout Where the student's employer is not involved in the manufacture of a product an alternative topic relevant to the company can be agreed with the programme manager The topic to be covered will be decided by the student in association with their employer and should include the development of a new product or the evaluation of a new process or the study of a particular problem or a literature review The student will be required to give a short presentation on their assignment to the class and lecturer	64
	Total	64

Practical

S. No.	Experiments	No. of Practicals
1.	Practical exercise on entrepreneurship motivation training– Micro lab Interface with successful food entrepreneurs.	10
2.	Market survey for identification of products and product selection, cost estimation. Project formulation, group discussion and report writing	10
3.	Visit to a government agency for appraisal on policies. Visit to non-governmental institutions	10
4.	promoting entrepreneurship. Critical analysis of financial institutions government and non- government, preparation of financial statements and group discussion.	10
5.	Financial analysis of projects prepared, planning, implementation of the project. Learning product promotion techniques, developing brand name and label and group discussion. appraisal of packaging materials and techniques, analysis of advertisements.	14
6.	Visit to successful enterprises Performance review of the unit – Profitability and report	10
	Total	64

Suggested Readings

- Balasubramanian, A. 1998, Personal management, Everest Publishing House, Pune.
- Kotler, P. 1997. Marketing management 9thedn .Prentice-Hall of India, New Delhi.
- Sivakamasundari, S. 1995. Entrepreneurship development for rural women -Vol-I, Asian and Pacific Centre for Transfer of Technology, New Delhi.

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