FCN- 112 FOOD CHEMISTRY – I 3 (2+1)

Theory

No. of Units	Topics	No. of Lectures
1	Nature Scope and development of food chemistry, role of food chemist.	2
2	Moisture in foods Role and type of water in foods. Functional properties of water, role of water in food spoilage. Water activity and sorption isotherm iv) Molecular mobility and foods stability	4
3	Dispersed systems of foods Physicochemical aspects of food dispersion system a) Sol b) gel c) foam d) emulations Rheology of diphase systems	4
4	Carbohydrates Functional characteristics of different carbohydrates (sugars- water relationship, sweetness). Maillard reaction, caramelizateion, methods to control non enzyjmatic reactions. Modification of carbohydrates- unmodified and modified starches, modified celluloses Dietary fibres NDF, ADF, Cellulose, hemicellulose, pectin and carbohydrates digestibility – sugars and starch and their energy values. Functional properties of kpolysaccharides, natural vegetable gums, carbohyderate composition of various natural foods.	5
5	Proteins in foods Physicochemical properties- ionic properties, protein denaturation, gelation and hydrolysis. Protein content and composition in various foods- cereal grains, legumes and oilseed proteins, proteins of meat, milk,egg and fish. Functional properties of proteins in foods – water and oil binding, foaming, gelation, emulsification. Effects of processing on functional properties of proteins- heat processing alkali treatments, chilling, freezing, dehydration and radiations. Unconventional sources of proteins- SCP fish protein concentrates, leaf proteins.	5
6	Lipids in foods Role and use of lipids /fat, occurrence, fat group classification,	6

	Physicochemical aspects of fatty acids in natural foods, hydrolysis, reversion, polymorphism and its application. Chemical aspects of lipolysis, auto oxidation, antioxidants, Technology of fat and oil processing a) Refining b) Hydrogenations c) Inter etherification d) Safety use of oils and fats in food formulation	
7	Enzymes in food industry Carbohydrases (Amylases, cellulases, pectinases, vertases) Proteasase Lipases and oxidases in food processing.	4
	Total	30

Practicals

No. of Units	**Topics**	**No. of Experiments**
1	Determination of moisture content of foods using different methods.	2
2	Studies of absorption isotherms of different foods.	2
3	Swelling and solubility characteristics of starches	2
4	Rheological properties of diphase systems	2
5	Determination of crude proteins by microkjaldhal method	2
6	Determination of essential amino acids i.e. Lysine, tryptophan, methionine etc.	2
7	Isolation of egg and milk protein	2
8	Preparation of protein isolate and concentrate of plant proteins	2
9	Determination of acid value, saponification value and iodine number of fat/ oil	2
10	Assay of amylases, papain and lipases.	3
	Total	**21**

REFERENCE BOOKS

1 Food Chemistry- Vol-I Fennama O.R.
2 Food Chemistry Mayer L.H.

FCN- 123 FOOD CHEMISTRY - II 3 (2+1)

Theory

No. of Units	Topics	No. of Lectures
1	Chemistry of food flavour Philosophy and definitions of flavour Flavourmatics / flavouring compounds Sensory assessment of flavour Technology for falavour retention	3
2	Food additives and Technology General attributes Buffer systems/ salts / Acids Chelating agents and sequestrants Antioxidants Antimicrobial agents Non-nutritive and low calorie sweetners Stabilizer and thickeners Fat replacers Texturizers and improvers	4
3	Pigments in animal and plants kingdoms Heme pigments Chlorophyll Carotenoids Phenolic and flavonoids Betalins Effect of processing on pigment behavior Technology for retention of natural colours of food stuffs	7
4	Food colorants Regulatory aspects –Nartural and synthetic permitted food colours. Properties of certified dyes Use of regulatory dyes Colour losses during thermal processing	3
5	Vitamins and minerals Dietary sources requirements Allowances Enrichment Restorations Fortifications Losses of vitamins and minerals Optimization and retention of vitamins and minerals	4

6	Food toxicology Inherent toxicants – antinutritional factors their occurrence, effects and methods of elimination or inactivation- protease inhibitions, lectins, lathyrogens, phytates and flatulence factors Terms in toxicology Safety evaluation using traditional and modern approach Food Contaminants Pesticidal residues – permitted limits Toxicology and public health	4
7	Enzymes in foods – Role of endogenous enzymes in maturation and ripening Enzymatic browning- mechanism, methods of regulajtion or control.	2
	Total	**27**

Practical

No.of Units	**Topics**	**No. of Lectures**
1	Preparation of mineral solution by using ash and tri acid method (dry and wet oxidations)	2
2	Estimation of calcium	1
3	Determination of phosphorus	1
4	Determination of iron	1
5	Estimation of magnesium	1
6	Estimation of tannins and phytic acid from food	2
7	Determination of vit. A (Total carotenoids)	1
8	Determination of ascorbic acid by dye method	1
9	Determination of niacine and pyridoxine	2
10	Determination of food colors	1
11	Assessment of hydrocolloids as food additives	1
12	Assessment of various pectinases from fruits and vegetables	2
	Total	**16**

REFERENCE BOOKS

1 Food Chemistry-Vol.I Fennama O.R.
2 Food Chemistry Mayer L.H.

FCN-124 HUMAN NUTRITION 3 (2+1)

Theory

No. of Units	Topics	No. of Lectures
1	Concepts and content of nutrition Nutrition agencies Nutrition of community Nutritional policies and their implementation Metabolic function of nutrients	3
2	Water and energy balance Water intake and losses Basal metabolism- BMR Body surface area and factors affecting BMR	3
3	Formulation of diets Classification of balanced diet Preparation of balanced diet for various groups Diets and disorders	5
4	Recommended dietary allowances For various age group According physiological status Athletic and sports man Geriatric persons	5
5	Malnutrition Type of Malnutrition Multi-factorial causes Epidemiology of under nutrition and over nutrition Nutrition infection and immunity Nutrition education	5
6	Assessment of nutritional status Diet surveys Anthropometry Clinical examination Biochemical assessment Additional medical information	4
7	In-born error of metabolism Blood constituents Nutrients Hormones and enzymes Miscellaneous disorders	4

8	Food fad and faddism	1
9	Potentially toxic substance in human food	1
	Total	**31**

Practicals

No. of Units	Topics	No. of Experiments
1	Role of various national and international agencies in field of human nutrition	1
2	Calculation of BMR and body surface area	2
3	Preparation of balance diets, evaluation of energy value and techno economical feasibility	3
4	Anthropometric measurements	2
5	Techniques in animal feeding experiments	2
6	Biochemical analysis of urine and blood	2
7	Nutritional survey	2
8	Determination of energy value Bomb Calorimeter On basis of composition	2
9	Computation of Energy requirements On the basis of Physical activity ACU unit	2
	Total	**18**

REFERENCE BOOKS

1 Community Nutrition Mc Laren
2 ICMR Publications
3 Food and Nutrition M. Swaminathan
4 Assessment of nutritional Status of the community D.B. Jelliffee

FCN- 235 TECHNIQUES IN FOOD ANALYSIS 3 (1+2)

Theory

No. of Units	Topics	No. of Lectures
1	Nature and concepts of food analysis Rules and regulations of food analysis Safety in laboratory Sampling techniques	3
	Principles and methodology involved in analytical techniques PH Meter and use of ion selective electrodes Spectroscopy a. Ultra violet visible, florescence	15

	b. Infrared spectro c. Atomic absorption and emission d. Mass spectroscopy i) Nuclear magnetic resonance and electron spin resonance ii) Chromatography Adsorption Column Partition Gel-filtration Affinity Ion-exchange Size-exclusion method Gas liquid High performance liquid chromatography Separation techniques a. Dialysis b. Electrophoresis i) Paper ii) SDS gel electrophoresis iii) Immuno electrophoresis c. Sedimentation, ultra filtration, ultracentrifugation d. Iso-electric focusing e. Isotopic techniques f. Manometric techniques.	
3	Principles and methodology involved in analysis of foods. Rheological analysis Textural profile	2
4	Immuno assay techniques in food analysis Isotopic and Non-isotopic immuno assay Enzyme-immuno assay	2
5	Evaluation of analytical data Accuracy and precision Statistical significance Co-relations regression Computers for data analysis and result interpretation	3
6	Sensory analysis of food Objective method ii) Subjective method	3
	Total	**28**

Practicals

No. of Units	**Topics**	**No. of Experiments**
1	Analysis of heavy metal using atomic absorption	1

	spectrophotometer	
2	Estimation of phytic acid using spectrophotometer	1
3	Separation of amino acids by two-dimensional paper chromatography	2
4	The identification of sugers in fruit juice using TLC	1
5	Separation of proteins by Ion-exchange chromatography	1
6	Molecular weight determination using sephadox-gel	2
7	Identification of amino acids by paper electrophoresis	1
8	Gel-electrophoresis for analytic techniques	2
9	Quantitative determination of sugars and fatty acid profile by GLC	2
10	Quantitative make-up of water and fat soluble vitamins using HPLC	2
	Total	**15**

REFERENCE BOOKS

1 Food Analysis Theory and Practice — Pomeranz & Meloan
2 Methods in Food Analysis — Maynard
3 Food Biochemistry — Eskin, Henderson and Twonsend.
4 Post Harvest Physiology, Handling and Utilization of Tropical and Co-west port cohn. — Pantastico, AVI Publishing
5 Subtropical Fruits and Vegetables. — R.B. Wills, W.B.Mc Glasson,
6 Post harvest : An Introduction to the Physiology and Handling of Fruits and Vegetables. — D.Graham T.H. Lee and E.G. Hall
7 Introduction to practical Biochemistry — Plumer.

FCN- 246 FOOD ADDITIVES 3 (2+1)

Theory

No. of Units	Topics	No. of Lectures
1	Intentional and unintentional food additives their toxicology and satry evaluation	2
2	Naturally occurring food additives	3
3	Food colour (natural and artificial)	3
4	Pigments their importance and utilization as food colour	3
5	Taste and flavour inducer, potentiater	3
6	Food preservatives and their chemical action	3
7	Role mode of action salt, chelating agents stabilizers and thickners, polyhydric alcohol, anticaking agent, firming and colouring agent,	3

	flour bleaching agent, antioxidants, non-nutritional sweetness and antimicrobial agents	
	Total	**21**

Practicals

No. of Units.	Topics	No. of Experiments
1	Evaluation of GRAS aspect of food additives	2
2	Identification of food colour by TLC	2
3	Isolation and identification of naturally occurring food pigments by paper and TLC	2
4	Spectrophotometric method of total chlorophyll (A&B)	2
5	Determination of diacetyl content of Butter	2
6	Role mode of action of chelating agent in fruit juice	2
7	Role and mode of action of stabilizer and thickener in frozen dairy products. (Ice-cream)	2
8	Role and mode of clarifying agent in fruit juices	1
9	Role and mode of antioxidant in frozen fish	1
10	Role of leaving agent in baked food product.	1
	Total	**17**

REFERENCE BOOKS

1 Food Chemistry- Vol-I Fennama O.R.
2 Food Chemistry Mayer L.H.

FCN-247 ENVIRONMENTAL SCIENCE 3 (2+1)

Theory

No. of Units	Topics	No. of Lectures
1	Environmental science: An introduction	2
2	Ecosystem: kinds, structure, characteristics, functioning	2
3	Biochemical cycles	1
4	Natural resources and their managements	2
5	Environmental pollution.	2
6	Air pollution	2
7	Water pollution	2
8	Solid waste pollution	2

9	Noise pollution	1
10	Soil pollution	2
11	Radio active pollution	1
12	Food processing industry waste and its management	2
13	Management of urban waste water	1
14	Recycling of organic waste	2
15	Recycling of factory effluent	2
16	Control of environmental pollution through low	2
17	Composting of biological waste	2
18	Sewage, uses of water disposal effluent treatment, microbial examination	
	Total	**32**

Practicals

No. of Units	**Topics**	**No. of Experiments**
1	Environment and its analysis	1
2	Water quality parameters	1
3	Collection of sample for pollution study	1
4	Determination of pH/ acidity/alkalinity from sample	2
5	Estimation of dissolved oxygen	1
6	Estimation of BOD	2
7	Estimation of COD	1
8	Estimation of nitrates	1
9	Estimation of phosphates	1
10	Estimation of pollutant elements	1
11	Estimation of heavy/ toxic elements	1
12	Estimation of lead / mercury	1
13	Visit to industrial sewage disposal unit	1
	Total	**15**

REFERENCE BOOKS

Environmental Biology — Dr. K.C. Agrawal.

Fundamentals of Environmental Science — G.S. Dhaliwal and G.S. Sanghai