4263 - FOOD CHEMISTRY

Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)			
					Theory		Practical Ex.	Total
Lectures	Practical	Credits						
2	4	6	25	25	3Hrs	100	50	200

Pre-requisite	Source
4260	FOD

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Semester	Theory	Test	Total	TW	PR	Gr Total
	75	25	100	50	50	200

Rationale: This course in Food Technology is designed to give the student a proper understanding of the chemical constituents of food and the chemical changes these constituents undergo. This is very essential for the students to comprehend the alterations that occur in food commodities during processing and the measures that should be taken to attain a high product quality. Practical work is designed to develop skills in basic techniques in food analysis such as gravimetric and volumetric analysis and also in the use of simple instruments such as monopan balance, PH meter, etc.

COURSE CONTENT	Hrs	Mks
1. INTRODUCTION Significance of food chemistry in food processing and preservation.	1	-
2. PROXIMATE COMPOSITION OF FOOD Definition. Examples of proximate composition of various food commodities.	1	6
3. CARBOHYDRATES Definition, occurrence, classification. Monosaccharides: Definition, important naturally occurring monosaccharides (pentoses and hexoses), structure (open chain and cyclic) of glucose, fructose, mannose and glactose with D and L configuration, structure of xylose, arabinose and ribose. Properties of monosaccharides: Optical activity, Reactions of carbonyl group: Oxidation, reduction and reducing action of sugars in alkaline solution. Reactions of hydroxyl group. Formation of glycosides, formation of esters. Degree of sweetness of various sugars. Oligosaccharides: Definition. Disaccharides: Definition. Sucrose, lactose, maltose and occurrence, structure and properties. Polysaccharides: Definition. Starch: Occurrence, structure and properties (gelatinisation, retro gradation, physical properties), comparison of properties of amylose and amylopectin starch,giving sources of both. Pectic substances: Occurrence, definition of various types of pectic substances, definition of	10	24

high methoxyl and low methoxyl pectin, factors affecting gel formation of low and high methoxyl pectin, uses of low methoxyl and high methoxyl pectin in foods. Cellulose: Occurrence, structure and properties.

Non-enzymatic browning. Maillard reaction, Ascorbic acid oxidation and caramelisation of sugars in alkaline solution. Conditions favouring the above three types of reactions and end products formed.

4. PROTEIN	9	27

Definition.; Amino acid: Definition. Classification of amino acid: Essential and non-essential, based on chemical nature.

Structure of protein molecular weight, amino acid composition, peptide bond conformation.

Classification of proteins (simple protein, conjugated protein and derived protein).

Properties: Colloidal nature, amphoterism, solubility, hydrolysis, colour, reactions, oxidation-reduction, hydration, sensory characteristics.

Protein denaturation. Outline of mechanism. Factors affecting protein denaturation.

5. OILS AND FATS	6	24

Definition of lipids, types of lipids (simple lipids, compound lipids and derived lipids) with example.

Definition of oils and fats, occurrence. Composition of oils and fats. Structure of triglyceride.

Fatty acids. Definition of saturated and unsaturated fatty acids. Structure of saturated fatty acids Butyric acid to arachidic acid occurrence.

Physical properties of oils and fats.

Hydrolysis of oils and fats: Outline of mechanism and product formed.

Oxidation of oils and fats: Outline of mechanism and product formed.

Flavour reversion in oil.

Phospholipids. Definition, occurrence. Structure of lecithin, cephalin. Uses of phospholipids in food.

6. PIGMENTS AND FLAVOUR COMPOUNDS	5	19

Pigments and flavour compounds. Chlorophyll, Carotenoids, Anthocyanin and Myoglobin: Chemical characteristics and stability to processing conditions. Essential oils and tannins: Chemical characteristics with examples of each in food commodities e.g. Peel oil of citrus, mint oil, geranium oil, tea, etc.

Total	32	100

NOTE- Chemical structures in Topics (6) and (7) are not included for examination purpose.

PRACTICALS.

1) Use of monopan balance, pH meter and analytical balance.
2) Determination of moisture in food sample by oven drying method.
3) Determination of ash in food sample: Total ash. Acid soluble ash. Acid insoluble ash. Alkalinity of ash.
4) Preparation of standard solution. Preparation and standardisation of alkali solution. Preparation and standardisation of acid solution. Preparation and standardisation of sodium thisoulphate solution
5) Determination of acidity and pH of food sample. Liquid food. Solid food. Fresh fruit.
6) Determination of salt content in food sample.
7) Qualitative tests for identification of various sugars.
8) Determination of sugar content in food sample by Lane-Eynon method.
9) Qualitative tests for identification of various proteins.
10) Estimation of crude protein in food sample by Kjeldahl method.
11) Determination of specific gravity of oil sample.

12) Determination of saponification value oils and fats.
13) Determination of peroxide value of oil.
14) Determination of acid value and free fatty acid content of oils and fats.
15) Determination of iodine value of fats and oils.

REFERENCE BOOKS.

1. Food Chemistry by Aurand Woods.
2. Food Chemistry by L. H. Meyer.
3. Introductory Food Chemistry by Aurand Woods.
4. Food Chemistry by Deman.
5. Laboratory Manual in Food Chemistry by Aurand Woods.
6. Analysis of Fruit and Vegetable Products by Dr. S. Ranganna.