World Skill Development Institute

Bakery and Confectionary Technology

Course Duration – 6 months

Baking is a food cooking method that uses prolonged dry heat by convection, rather than by thermal radiation. Heat is gradually transferred "from the surface of cakes, cookies and breads to their centre. As heat travels through it transforms batters and dough into baked goods with a firm dry crust and a softer centre".

Bakery products have become essential food items of the vast majority of population. The present day consumer looks for new bakery products, better appeal, taste and convenience from bakery foods. Bakery industry has also an important role in popularizing wheat in non-wheat consuming region of the World.

With good planning and access to good staff, raw materials and markets, setting up a bakery can represent an excellent enterprise opportunity. The course is invaluable reading for those starting their own baking business or any baker looking to improve their existing business in order to increase profits.

This course covers various aspects related to different bakery and confectionary products with their manufacturing process and also provides contact details of raw material, plant and machinery suppliers with equipment photographs and their technical specifications. It provides a thorough understanding of the many new developments shaping the industry and offers detailed technical coverage of the manufacturing processes of bakery products. It examines the nature of bakery products, the role of the ingredients in determining their quality, processing methods and their control.

Various bakery products covered in this course are wheat ingredients, other grain ingredients, shortenings, emulsifiers, antioxidants, water and salt, different types of breads and biscuits, cakes, buns, icings, production of cookie and cracker, spices, flavours, colors, leavened and unleavened products, air-leavened products, chemically leavened bread and rolls, chemically leavened sweet goods, Yeast-leavened plain bread, rolls, dough, preservation of bakery products, milk and egg ingredients, fruits, vegetables, nuts and many more.

Food Mixer, Cookie Extruder, Rotary Oven, Biscuit Sandwiching Machine, Tunnel Gas Oven, Flour Mixer, Cookies Rotary Moulder, Bun Divider Moulder, Planetary Mixer, Spiral Mixer, Pillow Packing Machine, Oil Spray Machine are the various equipments described in this course with their technical specifications.

Confectionery in a broader sense implies the preservation of sweet meat preparation in the form of candies, caramels, chocolate, processed cocoa products and traditional Indian confectioneries. India is a country with a collection of wide range of different cultures and many festivals and occasions are being celebrated in different parts of the nation and confectioneries play a major role in those special occasions. Therefore, the confectionery industry in this country has got a huge potential and this sector has grown recently in the India with the entry of many foreign companies. Special emphasis has been made on describing the various process parameters and equipments used with the help of process diagrams wherever necessary.

The major content of this course are confectionery ingredients, flavour, gelatinizing agents, gums, glazes, waxes, traditional Indian confections, manufacturing processes and formulations of confections, nutritive value of confectionery products. This course also describes about the science and technology of chocolate and confectionery, packaging of confectionery products, quality control, future confectionery industry etc.

Apart from these the course also contains details of cooking techniques, formulae, processes. The incorporation of flavours and essences, permitted colours used quality control aspects along with sources of plant, machinery and raw materials.

This course aims to provide comprehensive information on different types of bakery and confectionary products. The course is aimed for food technologist, scientists, research scholars, as well as for new entrepreneurs and those who are engaged in this industry.

Part 1

1. Ingredients Made From Wheat

Introduction

Wheat

Commercial Wheat Varieties

Composition of Wheat

Lipids

Utilization of Wheat

Determining the Quality of Wheat

2. Other Grains Ingredients

Introduction

Durum

Special Quality Considerations

Utilization

Rye

Chemical Physical Characteristics

Triticale

General Characteristics

Quality, Composition, and Nutritional Factors

Utilization

Rice

Structure and Composition

Quality Factors

Use of Rice in the Baking Industry

Millet

Varieties and Distribution

Structure of the Seed

Food Uses

Corn

Structure and Composition

Quality Factors

Traditional Food Products From Corn

Oats

Classification

Structure and Composition

Barley

Description of Plant and Seed

Utilization of Barley

Structure and Composition of Barley Kernels

Quality Factors

3. Shortenings, Emulsifiers and Antioxidants

Introduction

The Chemistry of Fats and Oils

Shortenings From Natural Sources

Animal Fats and Oils

Vegetable Shortenings

Quality Assurance of Fat and Oil Products

Tests

Specifications

Emulsifiers

Lecithin

Monoglycerides and Deglycerides

Other Food Emulsifiers

Antioxidants

Synthetic Antioxidants

Natural Antioxidants

Fat Substitutes and Replacements

4. Water and Salt

Flavourings

Enrichment

Bread Manufacture

Straight Dough Method

Sponge Dough Method (Semi-Automatic)

Make Up

Comparison of Straight and Sponge Dough Method

Advantages and Disadvantages of two Methods

Automatic Process to Manufacture Bread

Recipies for Breads

White Pan Bread

Milk Bread

Sweet Bread

Rice Bread

Closed Pan Bread

Sponge Dough

Final Dough

Make up and Baking of the Bread

Egg Bread

French Bread

Straight Dough Method

Raisin Bread

Whole Wheat Bread (Straight Dough Method)

Rye Bread

Rye Bread (Leay Sow)

Vienna Bread

Special Breads

Date-Nut Bread

Low Sodium Bread

Cheese Bread

Specification for Various Types of Breads

White Bread

Other Requirements

Mass of the Bread

Wheat Meal Bread

Other Requirements

Crust and Crumb

(a) Optional Ingredients

(b) Mould Inhibitors

Bread Improver

Requirements

Biscuits

Introduction

Biscuit Raw Materials

Cereals

Sweetener

Shortening

Milk

Leavening Agents and Nutrients

Miscellaneous Products

Market Potential

Statewise Units of Biscuits in Organised Sector

Manufacturing Process

Recipes for Various Types of Biscuits

Arrowroot Biscuit

Shell Biscuits

Digestive Biscuits

Honey Comb or Crimp Biscuits

Almond Fruit Biscuits

Walnut Biscuits

Soda Biscuit

Coconut Biscuits

Nice Biscuits

Saltish Biscuits

Marie Biscuits

Ester Biscuits

Sandwich Type Biscuits

Cheese Biscuits

Rice Biscuits

Corn Flour Biscuits

Coffee Biscuits

Victoria Biscuits

Edinburg Biscuits

Snow Drop Biscuits

Luncheon Biscuits

Special Combination Wheat Biscuits

Simple All Purpose Biscuits

Soojee Biscuits

Special Nut Biscuits

Directions

Corn Flour Coconut Biscuit

Chocolate Vanilla Biscuit

For Icing

Peppermint Cream Biscuits

Biscuit Coatings

White Coating

Dark Chocolate Coating

Lemon Coating

Orange Coating

Malt Milk Coating

Few Points for Making Good Biscuits

Cookies

Basic Ingredients

Bonding Materials or Toughers

Tenderzing Materials

Floors

Shortening

Sugar

Lecithin

Milk

Eggs

Rotary Moulded Cookie

Cutting Machine Cookie

Wire Cut Cookie

Spread of the Cookies

Equipments For the Manufacture of Cookies

Wire Cut Machine

Stamping and Rotary Catting Machines

Rotary Moulded Cookies

Formula for Sugar Wafer Butter

Processing of Sugar Wafer

Coatings for Cookies

Coatings for Cookies Enrobing

Vanilla Coating

Dark Chocolate

Dark Cocoa

Coconut

Peanut Coating

Pie Fillings

Fruit Fillins

Apple Pie Fillings

Banana Cream Starch-Based Gel Filling

Strawberry Flavoured Fillings

Cream Style Fillings

Pie Crusts

The Flour

The Shortening

The Salt

Sugar

Flaky Crusts

Mealy Crusts

Formulations and Procedures for Pie Crusts

Long Flake Pie Crusts

Dough for Fried Peas

Fruit Pie Dough

Mealy Crust Dough

Fried Pies

Faults in Pie Crusts

Soda Crackers

Flour

Water

Shortening

Salt

Yeast Food

Formulas for Soda Crackers

Fermentation

Manufacturing

Absorption

Salt

Sugars

Amylolytic Enzymes

Cakes

The Flour

Soft Straight Flour

Sugar

Shortening

Egg

Milk

Formulation Guidelines

Cake Processing

Common Faults in Cakes

Texture Defects

Defects of Crust Appearance

Too Low Volume

Irregular or Coarse Grain

Various Types of Cakes

Corn Flour Cake

Fruit Cake

Rece Cake

Petha Cake

Maize Floor Cake

Cream Cake

Cheese Cake

Sponge Cake

White Layer Cakes

Rich White Layer Cake

Universal Cake Mix

Yellow Layer Cake

Chocolate Cake

Devil's Food Cake

Chiffon Cake

Layer Cake

Pound Cake

Hard Rolls

Soft Rolls

Vienna (Kaiser) Rolls

Make up of the Rolls

Hamburger Rolls

Make up and Baking of the Rolls

Buns

Bath Buns

Saffron Buns

Cross Buns

German Buns

Sweet Crumb Buns

Round Shaped Filled Bun

Dough

Syrup Wash

Braid Buns

Square Buns

Figure 8 Shaped Buns

Muffins, Nankhati and Pizza

Mufins

Bran Muffins

Whole Wheat Muffins

Nankhatai

Pizzas

Recipe for Pizza

Icings

Some Guidelines for Icing Preperation

Flavours Development in Icings

Fluffy Icings

Recipes for Various Types of Icing

Chocolate Icing

Butter Icing

Water Icings

Royal Icings

Icing Paste (General)

Vanilla Icing

Butter Scotch Icing

Butter Scotch Paste Icing

Banana Icing

Caramel Boiled Icing

Honey Macaroon Icing

Spice Cake Icing

Pecans

Poppy Seeds

Walnuts

Nut Substitutes and Defetted Nuts

Fruits

Dried Fruits

Candied or Glace Fruit

Canned Fruits

Frozen Fruits

Fruit Jams, Jellies and Preserves

Vegetables

Potatoes

Onions

Tomatoes

Carrots

8. Bakery Machinery and Equipment

Weighing Equipment

Manual Scales

Automatic Weighing Equipment

Liquid Measuring Equipment

Mixing

Mixing Equipment

Dry Blenders

Ribbon Blenders

Tumbler with Agglomerate Breakers

Vertical Screw Mixer

Equipment Selection

Continous Pre-Mixing Equipment

Horizontal Dough Mixer

Banbury Mixers

Miscellaneous Horizontal Dough Mixing Euipment

Mixing Mechanism

Vertical Planetary Mixers

Continous Mixers

Temperature and Mixing

Make-up Equipment

Dividers

Effect of Dividing Action on Dough Properties

Divider

Rounders

Controlling and Adjusting the Rounder

Proofer

Tray Type Intermediate Proofer

Maintenance

Intermediate Proofers

Moulders

Moulders for Cookies

Biscuit Rolling Machine

Biscuit Cutters

Fermentation and Proofing Enclosures

Construction Details

Baking Equipments

Ovens

Chamber Type Oven

Draw Plate Oven

Reel Oven

Tunnel Oven

Oven Heating

Fuels

Slicing Equipment

Reciprcating Slicers

Blade Slicer

Packaging Equipment

9. Spices, Flavors and Colors

Introduction

Coloring Additives

Uncertified Color Additives

Certified Color Additives

Natural and Artificial Flavors

Vanilla

Cocoa Products

Spices and Herbs

General Considerations

Spices Used in Bakery Products

Cinnamon

10. Cookie and Cracker Production

Ingredients Handling

Mixing

Dough Relaxation and Fermentation

Dough Machining and Forming

Dough Relaxing

Cutting Stage

Scrap Return

Salter of Sugar Sprinkling

Rotary Molding

Extruder-Dough Formers

Wire Cut

Rout Press

The Fruit Bar Co-Extruder

Baking

Direct-Fired Ovens, Gas Fired

Convection (Indirect) Ovens

Post Conditioning

Secondary Process

Icings

Enrobing

Sandwiched Cookies and Crackers

Biscuit Packaging

11. Unleavened Bakery Products

Introduction

Pie Crusts

General Considerations

Types of Pie Crusts

Baked Pies

Long-Flake Crust

Short-Flake Crust

Mealy Crust

Pressed Crumb Crusts

Savory Pies

Fried Pies

Causes of Faults in Pie Crusts

Strudel, Phyllo and Egg Rolls

Unleavened Cookies

12. Products Leavened Primarily With Water Vapor

Puff Pastry

Theoretical Considerations Affecting Layering

Practical Mehtods of Puff Pastry Production

Traditional Puff Pastry method

Automated Puff Pastry Production

Formin and Baking Puff Pastry

Trouble Shooting Puff Pastry

Crispbread

Eclair Shells, Cream Puffs, and Popovers

Cookies and Crackers

Beaten Biscuits

Function of Ingredients

Soda Breads

Buttermilk Bread

Irish Soda Bread

Irish Soda Bread

Boston Brown Bread

Chemically Leavened White Bread

Other Bread Varieties

Soda Biscuits

Scones

Muffins

Veggie Muffins

Snack Crackers

15. Chemically Leavened Sweet Goods

Composition

General Rules For Developing Formulas

Layer Cakes

Examples of Cake Formulas

Processing Chemically Leavened Sweet Goods

Trouble Shooting Cake Faults

Cup-Cakes

Cake Doughnuts

Formulation and Processing

Doughnut Trouble Shooting

Cookies

Relationship of Formula to Processing Method

Ingredients

Representative Formulas

16. Yeast-Leavened Plain Bread and Rolls

Principles of Plain Bread and Roll Production

White Bread

French Bread

White Rolls

Wheat Bread

Two Traditional Bread Processing Schemes

Straight Dough Method

Sponge-and-Dough Method

Reaction During Mixing

Dough Development

Establishing Vesicle Size

Conditioning the Dough

Temperature Rise During Mixing

Fermentation

Bulk Fermentations

Proofing

Pan Proofing

Dividing and Rounding

Bread-Molding Processes

Roll-Forming Processes

Baking

Effect of Form and Size of the Dough Piece

Cooling and Depanning

Defects of the Crust

Defects in the Crumb

Defects of Volume

Defects of Taste or Odor

Defects in Shelf-Life

17. Doughs

Introduction

Continuous Processing of White Bread and Rolls

Principles of Operation

Formulating White Bread for Continuous Plants

Making Fermentation Processes More Efficient

Three Kinds of Sponge Replacement Systems

Conditioning by Mechanical or Chemical Means

Systems Relying Principally on Chemical Modification

18. Breads

Sour Dough Breads

Microflora of Sour Doughs

San Francisco (Pacific Slope) Sour Dough Bread

Sour Dough French Bread

Panettone

Sal-Rising Bread

Rye and Multi-Grain Breads

Multi-Grain Breads

Rye Bread

Rye Bread Formula and Process

Other Variety Breads

Breads with Vegetable Ingredients

Breads with Dairy Ingredients

Dietetic Bakery Products

Reduced Salt

Reduced Fat

Gluten-Free

"Diabetic" or Sugar-Free

Reduced Calorie

No Cholesterol

19. Yeast-Leavened Sweet Doughs

Plain and Roll-In Sweet Doughs

Ingredients

Formulas, General

Straight Sweet Dough Formula and Procedure

Sponge Sweet Dough Formula and Procedure

Roll-in Sweet Dough Formula and Procedure

Procedures

Fruited Rolls and Stollen

Doughnuts and Other Fried Goods

General Formulas

Ingredient Specificaions and Functions

Procedures

Rotary Oven

Pillow Packing Machine

180º Layout Turning Machine

Oil Spray Machine

Biscuit Sandwiching Machine

Tunnel Gas Oven

Rotary Print Biscuit Forming Machine (Soft Biscuit)

Tunnel Electric Oven

Flour Mixer

Cookies Rotary Moulder

Bun Divider Moulder

Bread Moulder

Double Troley Bakery Oven

Cookie Dropping Machine

Planetary Mixer

Spiral Mixer

22. Raw Material Suppliers

Starch

Bakery Chemicals

Baking Enzymes

Baking Powder

Bread Improver

Cake Gel

Egg Powder

Flavouring Emulsion

Flexible Packaging

Glucose

Lecithin

Plastic Crates

Milk Products

Wheat Gluten

Yeast

23. Machinery and Equipment Suppliers

Part 2

1. Confectionery Ingredients

-Caramel

-International Standards for Sugar and Sugar Syrups

Reserved Descriptions for sugar Products

-Maltodextrins (Roquette Freres, 1984)

-Dried Glucose Syrups

-Uses of Glucose Syrups and Maltodextrins.

Dextrose Manufacture

Fructose (Levulose)

Sorbitol

Mannitol

Lycasin 80/50

-Nonnutritive (Synthetic) Sweeteners

Saccharin

Cyclamates

Sodium Cyclamate C6H12NSO3Na

Acesulfam K (Acesulfam Potassium)

Aspartame (Naturasweet, Canderel)

Talin

Legislation

-Invert Sugar

Use in Confectionery Industry

Honey

Malt Extract

Testing of Refined Sugars

Anti-Tailing Devices

Automatic Continuous Sugar Cooker

Automatic Continuous Sugar Cooker

Batch Roller

Cocoa

Cocoa Moth

Cocoa Selection

Fermentation of Cocoa Beans

2. Confectionery Fats

-Commonly used fat in confectionery industry

Production and Processing of Fats

Refining is Carried in 3 stages

Chemistry of Fats

Glycerides, Fatty Acids

-Hardening Fats

Packing and Storage of Fats

3. Milk and Milk Products

Liquid Milk

Composition

Milk Standards

Dry Millk

Whey Products

Lactose

Condensed Milk, Evaporated Milk

Block Milk

Other Milk products

4. Fruits, Preserved Fruits, Jam, Dried fruits

Composition of Natural Fruits

Preservation of fruit and fruit pulps

Candied and Preserved Fruits

Jams

Glazed or Glace Fruit

-Dried Fruit

Artificial Drying

Chellies

Freeze Drying

Ginger

Colouring

5. Flavour

Dried Fruit

Artificial Drying

Chellies

Freeze Drying

Nuts

Varieties of Nuts

Storage of nuts

-Starches, Soya Flour, soya protein

6. Gelatinizing Agents, Gums, Glazes, Waxes

Gelatine

Agar-Agar

Agar occurs in three forms

Pectin

Gums

Uses of Gum Arabic

Gum Tragacanth

Guar Gum, Locust Bean (carob) Gum

Guar Gum

Carob gum

Lacquers and wares

Shellac

Other Glazes

Spermaceti

Carnauba Wax

7. Traditional Indian Confections

Raw Materials

Packaging

8. Confectionery Processes and Formulations

-summary of confectionery Processes

Rolling and Cutting

Casting or Depositing

Hard Candy

Die Forming

Hard Candy

-Manufacturing Process

Fruit and nut bars

Fruit punch chocolates

Butter Creams Chocolate

-Soft candies

-Carbonated Candy

Process of Manufacture

-Seed Confections (Popcorn Balls)

-Cotton Candy

-Coated Confections

Chewing Gum And Bubble Gum

Industry in India

-Toffee

Introduction

Manufacturing Process

-How to cut a Toffee by Toffee Cutter

Formulation For Different Kinds of Toffee

Plain Toffee

Butter toffee

Coconut Toffee

Milk Toffee

Malt Toffee

Plain Chewing Toffee

Chocolate Toffee

Pistachio Toffee

Everton Toffee

Licorice Toffee

Molasses Toffee

Molasses Toffee

Marmalade Toffee

-Chocolates

Chocolate toffee

Chocolate Covered Butter Toffee

Chocolate Annex Caramels

Chocolate Caramel Nougat Roll

Chocolate Honey Tablets

Chocolate Covered Coconut Caramels

Chocolate Coating Caramels

Speciality Chocolates

-Caramels, Toffees, Butter scotch, Fudge

The Milk Ingredient

Reconstitution of Milk Powder

Fats

-Large-Scale Production

Water Activity (ERH)

Composition

Colour

Faults

Preparation of Agar Jellies, Fruit Slices

-Coconut Paste, Coconut ICE

-Creme and Lozenge Pastes, Cachous, Tablets

Liqueurs

Chocolate Liqueurs

Sugar Crust Liqueurs

Licorice

Manufacture of Licorice Confectionery

Legislation

9. Nutritive Value of Confectionery Products

Food Value and its Composition

Carbohydrates

Fat

Proteins

-Mineral Matter

Vitamins

-The Labeling of Foods Containing Vitamins

Disadvantages of Confectionery

10. BIS Specifications

11.Science and Technology of Chocolate

and Confectionery

-Sugar Confectionery

Solubility, Saturated and Supersaturated Solutions

-Relative Humidity, Dew Point, Vapour Pressure,

-Water Activity Equilibrium relative humidity

Relative Humidity, Dew Point

pH, HYDROGEN ION CONCENTRATION

-Optical Activity

Specific Ration-Dextrose Equivalent

Scientific Instruments

-Spoilage Problems

Chocolate Bloom

Fat Bloom

-Crystallization of Cocoa Butter Under Different Ambient Conditions-Melting Point Changes

Heat Treatment of Chocolate

Fat Bloom-Summary

Sugar Bloom-Causes and Methods of Prevention

Other Faults

12. Packaging of Confectionery Products

Requirement of Packaging

Packaging Requirement

Use of Containers

Packaging Materials

Materials

Metal Cans

Types of Paper

Metal Foil

Foil Containers

Transparent Films

Metallized Films

Shrink and Stretch Films

Laminates

Testing of Wrappers for Various Other Properties

Types of Cans

Built-up Body

-DESSICANT POUCHES

13. Quality Control

-PRINCIPLES OF QUALITY CONTROL

-The Decidina Factor envolved in the Standard of Quality?

Quality Controllers

-How Should Quality Control Be Organized?

-Raw materials

Type of Raw Material

Microbiologicaly Quality Control

Factory Hygiene and Sanitation

14. Research and Development in

the Confectionery Industry

-Reasearch and Development in large Companies

Research and Development in small companies

Research Facilities

Ingredients

Manufacturing Processes

-Conditions To Be Observed During Production

Coloured Coatings and Pastel Coatings

-FORMULATIONS

-DIETETIC COATINGS

Diabetic Chocolate

Carob Coatings

Defatted Wheat Germ

"Slimming" Chocolates

Medicated Chocolates

-Emulsifiers in Chocolate

-Confectionery Coatings and Cocoa

-VEGETABLE LECITHINS

Soya Lecithin

Other Vegetable Lecithing

-SYNTHETIC PHOSPHOLIPIDS AND MODIFIED

-VEGETABLE LECITHINS

Toxicity Checks on YN

Fractionated and Modified Vegetable Lecithins :

-Use of lecithin in chocolate, cocoa Powder, Chocolate Drinks

Chocolate

-Cocoa and Drinking Chocolate Powders

-COLOURS FOR CONFECTIONERY

SELECTION OF COLOURING MATTER

METHOD OF DISSOLVING

-COMBUSTOR SUGAR BOILER

CONCHES

-THE SECOND SCHEDULE

Other Glazes

15. Future of Confectionery Industry

The Marketing of Confectionery

16. The Marketing of Confectionery

17. Suppliers of Raw Materials

18. Suppliers of Plant and Machinery