

THEORY OF
Bakery AND Patisserie

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Preface

Is baking an art or a science? *Bakery and Patisserie* are two aspects of a pastry kitchen that make a perfect blend of art and science. The art in *Bakery and Patisserie* is mostly limited to the presentation skills and arrangement of the product on display. The science part involves identifying correct ingredients, understanding their chemical reaction on any given product, and following the right process to make an ideal recipe. Due to constant awareness of health and eating organic food, many professionals and home bakers have started excelling in producing high fibre and gluten free bakery and pastry products for the discerning customers.

Globalization has changed the mind-set of many youngsters in India who wish to pursue careers in hospitality. Today, *Bakery and Patisserie* has become one of the most pursued careers in the hospitality sector. With many international chains coming to India, more and more job opportunities are seen to have been created in the kitchen. A lot of skilled bakers and patissiers also find jobs in large bakery production centres, high end hotels, and on ships. In fact with this surge of good hotels in the country, it has become fundamental for students to develop a keen interest in understanding the subject; hence making it a much-sought after course.

ABOUT THE BOOK

The book is intended for students of Diploma and Food Craft courses in hotel management, catering to the syllabus of National Council for Hotel Management and Catering Technology. It has been designed to give an introduction to bakery and pastry, layout of a pastry kitchen, basic culinary terms, and associated methods of production. It will help students to gain technical knowledge and skills of pastry making as well as familiarize themselves with the day-to-day working atmosphere of the department.

It has been developed keeping in mind the changing trends in modern pastry kitchen across the world. As there is a myriad of differences in the commodities and technology used across the world, it is important that one should be aware of the dynamics of pastry kitchen operations. The book also brings in my 26 years of experience with Oberoi Hotels and Resorts. This professional knowledge percolates down through chapters in the form of 'chef tips' which have been handed and circulated by chefs down the generations.

PEDAGOGICAL FEATURES

- ◆ Discusses roles of various commodities used in bakery and pastry along with different techniques used in preparation of bakery and pastry products
- ◆ Explains in detail the methods of incorporating air by chemical, physical, and biological methods in creating a range of pastry and bakery products
- ◆ Describes in detail the structure of the wheat and its milling process that determines the final quality of the baked product

- ◆ Explains the art of sugar work and lists all the precautions that must be taken whilst working with sugar
- ◆ Begins every chapter with learning objectives which give an introduction to the various topics discussed in the chapter
- ◆ Concludes chapters with a summary to help students gather all that they have studied in the chapter
- ◆ Provides important points (chef's tips) interspersed in the text to avoid accidents in the kitchen
- ◆ Explains practical aspects of bakery and pastry with photographs, tables, and figures
- ◆ Includes assessment tools such as objective type questions, essay type questions, and project assignments

STRUCTURE AND COVERAGE

The book is divided into 11 chapters.

Chapter 1, *Introduction to Pastry and Bakery* defines various sections of a professional pastry kitchen and provides an overview of the hierarchy and layout of the same. It discusses different kinds of weights, measurements, and oven temperatures (in Celsius and Fahrenheit) to be used while baking. Discussion on large and small equipment used in bakery and pastry along with pictures have also been provided for easy understanding.

Chapter 2, *Commodities in Bakery and Pastry* discusses in detail commodities such as fats and oils, types of dairy products, eggs, sweeteners, raising agents, chocolate, and various types of cheese used and their impact while baking. It also explains the structure of wheat and the milling process that determines the final product.

Chapter 3, *Techniques in Bakery and Pastry* covers different types of techniques used in bakery such as sifting, autolysis, kneading, proofing, shaping, panning, and baking as well as storing of breads. Other techniques used such as aerating, docking, whisking, whipping, folding, shortening, blind baking, rubbing, pinning, piping, icing, creaming, and lamination have also been explained in detail along with examples.

Chapter 4, *Bread Fabrication* explains the principles of basic dough making, role of ingredients such as flour, yeast, sugar, and salt on breads and how these are mixed to create variations. Various steps involved in production of breads with regards to temperature and timings have also been included. Popular international breads along with rich and laminated dough such as croissant, danish, brioche and more are discussed too.

Chapter 5, *Basic Pastes in Bakery and Pastry* discusses short crust, puff pastry, choux paste, sweet paste, *pate brise*, and *pate sable*. Precautions that need to be kept in mind whilst making them and different types of products made with these pastes are listed in tabular form along with pictures.

Chapter 6, *Basic Creams and Sauces* explains types of creams such as *crème chantilly*, caprice cream, buttermilk, lemon cream, ganache, almond paste, *touille* paste, and pastry cream along with sauces, and coulis that are used in pastry kitchen. Various kinds of meringues, their preparation and storage and a few classical desserts made by using these common creams and bases have also been covered.

Chapter 7, *Basic Sponges and Cakes* elaborates on the composition and types of basic cakes, sponges, and icings. It also discusses various kinds of faults that can occur in cake making. Different kinds of cakes and pastries that are served during afternoon tea are also listed in tabular form for student's benefit.

Chapter 8, *Cookies and Biscuits* discusses the difference between a cookie and a biscuit, types of cookies and various methods of preparing them. Various kinds of faults that can occur whilst making cookies are also discussed in this chapter.

Chapter 9, *Hot and Cold Desserts* classifies desserts under categories—hot, cold, and frozen. Under each category a few classical desserts that are commonly made internationally in pastry kitchen have been discussed. This chapter also talks about frozen desserts such as ice creams, sorbets, bombes, coupes, and gelatos.

Chapter 10, *Sugar Confections* covers types of sugar used for sugar confections. Products such as marshmallows, fudges, toffees, and candies made from sugar are discussed in detail along with their recipes for better understanding. Apart from this, the process of creating a sugar sculpture and precautions related to its preparation have been covered in detail.

Chapter 11, *Indian Sweets* explains the stages of sugar syrups with regards to the Indian cuisine. This chapter discusses in detail the regional influences on sweets from all parts of India. It also talks about various equipment used in making Indian sweets and desserts.

ACKNOWLEDGEMENTS

I want to mention certain people and organizations who have either directly or indirectly contributed towards this book. First and foremost, I would like to mention Mr Prithvi Raj Singh Oberoi, Executive Chairman and Mr Vikram Oberoi, Managing Director and CEO, under whose able guidance I have been able to collect all the knowledge pertaining to this book. I also want to thank Oberoi Centre of Learning and Development for letting me use the resources for research. I would like a special mention of all my colleagues and friends who have lent their encouragement and support in this venture of mine. I would like to thank the whole Oberoi Group for their support as well.

My thanks would be incomplete, if I did not mention the academicians and reviewers who reviewed the book and gave corrective feedback that helped frame the contents of the book. I also thank the editors and the team at Oxford University Press India for their constant follow-ups and support that motivated me to accomplish this project.

I extend my special thanks to all my near and dear ones and the professionals in the industry who have in some ways influenced the development of this book.

Last but not the least, I am grateful to my wife Shalini and my children Ojas and Amora, for their immense patience while developing this book.

Parvinder S. Bali

Features of



CHEF'S TIPS

- Get to know your oven as it is an important factor in successful baking.
- Have the accuracy of your thermostat checked regularly.
- Do not open the oven door during the early baking stages and avoid opening it too frequently as some products may collapse. If you often open the oven door, the moisture tends to escape from it by dropping the pressure and temperature inside it, resulting in collapse of products.
- Place items to be baked on a tray in an interlocking manner to allow free passage of air through them so that they bake evenly.
- Close the oven door slowly.

Chef's tips

Important points that should be kept in mind appear as tips throughout the text for quick recapitulation.

Activities

Activities have been interspersed in the chapters to aid students in understanding the practical side of the subject.



ACTIVITY

1. In groups of five, conduct a market survey of hotels and speciality restaurants and make a list of various kinds of frozen desserts served by them. Further, make a note of commercially available and home-churned ice creams and share with the rest of the group.
2. In groups of three or four, make at least two sundaes or coupes with sauces, garnish, and accompaniments. Present the dishes to other groups and get your product evaluated and critiqued. Make standard recipes of the same and distribute to everybody.
3. In groups of five, undertake a market survey of hotels and speciality restaurants and note the components of a dessert buffet. Observe how the desserts are balanced with regard to textures, temperatures, etc. Record your observations and share your findings with other groups.
4. Divide the class into groups and prepare a range of hot puddings using different bases as explained in Table 9.1. Compare the taste, textures, and flavours and observe what desserts can be served hot or cold. Share your learnings with other groups and record them.



OBJECTIVE TYPE QUESTIONS

1. Define a sponge and how is it different from a cake and bread.
2. List down the role of ingredients used in sponge making.
3. Define mousse cake, and dark and white chocolate mousse cake?
4. How is chiffon cake different from angel cake?
5. What is the difference between Victoria sponge



ESSAY TYPE QUESTIONS

1. Define icing and what equipment is used for making it.
2. Explain different types of icings used on cakes and pastries.
3. Write down the procedure of making joconde sponge.
4. Differentiate between chilled cheesecake and baked cheesecake.
5. Why are Yule logs popular during Christmas?
6. Briefly describe at least five types of hi tea cakes and pastries.

Exercises

A series of objective type and essay type questions highlight the major topics covered in the chapter. The questions enhance learning and can be used for review and classroom discussion.

the Book

Figures and Tables
All chapters contain figures and tables to illustrate the topics discussed in the chapters.

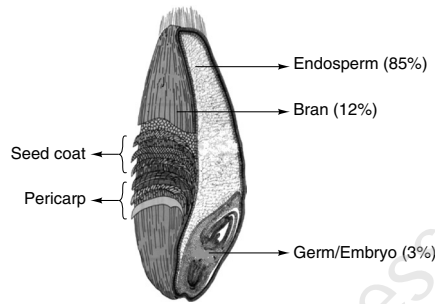


Fig. 2.1 Structure of wheat grain

Table 2.1 Parameters for selecting quality flour

Parameter	Description
Colour grading	After flour is milled, some companies also bleach the flour to make it whiter with the help of nitrogen gas or oxidising agents. It is better to buy unbleached flour and different companies have their own standard measurements for grading the colour of the flour. In most cases, grade 5 is the highest white colour without any bleaching.

Photographs

Photographs have been added in the chapters to help readers understand concepts better.



Oatmeal raisin cookie



Chocolate chip cookie



Macaroon



Crunchy drop



Florentine

Fig. 8.1 Examples of drop cookies



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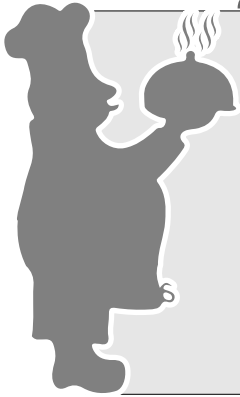
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Introduction to Pastry and Bakery



LEARNING OBJECTIVES

After reading this chapter, you should be able to

- ♥ understand the pastry and bakery department
- ♥ differentiate between the various sections of the pastry kitchen
- ♥ remember the terms associated with day to day pastry and bakery operations
- ♥ memorise the hierarchy of the department and reporting structure
- ♥ know the basic layout of the pastry kitchen and understand the importance of the same
- ♥ weigh and scale ingredients as per the required recipe
- ♥ identify the large equipment and machinery used in the pastry department

INTRODUCTION

Though the term bakery is related to baking, the bakery department is not restricted to only making and baking of breads. Breads are one of the earliest products that were made by the Egyptians and Romans around 5,000 years ago. Some of the world's oldest breads can be found in Switzerland, and since they might be as old as 5,000 years, their baking technique and who started the same is not very clear and certain.

The first premier baker's guild was established in Rome in 14 AD in the reign of Emperor Augustine and breads were one of the most important commodities for armies and peasants. The grain was offered to people for free by the government, which led to opening of professional bakeries that in turn would make breads for the people by charging a small amount of money. Since many homes did not have ovens to make their own bread, they usually bought it from bakeries. The earlier ovens were huge and wood fired. The enormous size ovens were hence restricted to professional bakeries and in 14th century there were close to 2,500 bakeries that had been set up to meet the needs and demands of people wanting a loaf of bread.

The modern bakery produces all kinds of products such as breads, cakes, pastries, cookies, desserts and hence, is commonly referred to as bakery and confectionary. In olden times, bakeries were restricted to the production of breads and biscuits but the advent of technology and introduction of new ingredients such as chocolate, sugar, and dairy products, created yet another array of sweet products that got associated with baking. Since then this department in hotels came to be known as pastry kitchen

or *patisserie* in French. Bakery and confectionary is one of the most important sections in a large hotel as it produces goods that are used during all meal periods whether breakfast, lunch, dinner, or snacks. It is because of this reason that the department has to work round the clock and is one of the busiest sections in any given hotel.

Since several terms are related to bakery and confectionary, therefore, before we start to read this book, let us get acquainted with the bakery and pastry terminologies to better familiarise ourselves with the subject.

Table 1.1 Terms related to bakery and confectionary

Term	Description
Agar Agar	Dried purified stems of seaweed that swell with water to form gel. It is also used as a substitute as vegetarian gelatin and also known as china grass
Batter	Flour and liquid mixture of flowing consistency
Baume	Unit or scale of measuring the density of sugar syrup through a saccharometer or refractometer
Blind bake	Baking of a tart or flan without any filling inside
Bouchée	Small bite size pastry cases usually filled with savoury fillings
Brûlée	Literally translates to burnt. Applied to dishes such as crème custards that are finished with caramelized or burnt sugar
Candied	Preservation of fruit or vegetable by cooking in super saturated sugar solution and subsequently drying, which results in coating of sugar crystals
Caramelize	To heat the sugar until it melts to a golden brown colour
Chemiser	To line a mould as for ice cream bombe mould or to coat an item with jelly
Coagulate	Partial or complete hardening of protein with application of heat
Comfiture	A mixture of fruits and sugar cooked to a jelly consistency, for example, jams and marmalades
Congéal	To change a liquid into solid by lowering the temperature whilst cooking. It also refers to formation of gelatin or gelling of a product
Coulis	A liquid fruit puree cooked with sugar and usually strained to a smooth sauce consistency
Coverture	Covering chocolate with a minimum cocoa butter content of 32%
Creaming	Process of mixing butter and sugar together to a fluffy stage
Crimping	Giving a decorative edge to various doughs and pastes with the help of pinching tools
Croquant	Caramelized sugar and nut mixture that is crushed to form a granular mixture
Crust	The top most layer of a baked product, usually a bread which gives the name to the bread such as soft roll or crusty roll
Crystalize	A property of sugar to get back into solid stage from liquid stage either with agitation or temperature change
Curdle	Separation of emulsion formed when fat, sugar, eggs, etc., are beaten together. Usually, caused by adding liquids too quickly or are at cold temperature. Curdling can also happen when a dairy product is heated with acid
Dariole	A deep round mould with sloping sides
Dead dough	A bread dough that is made without any addition of yeast or other leavening agents. These doughs are used to prepare breads for displays and not consumption
Dessert	Last course of the meal. Also, commonly used word for sweet dishes

Table 1.1 (Contd)

Term	Description
Dextrin	A soluble gummy substance formed from starch by the action of heat
Docking	Making holes in a rolled dough or paste, which allows the pastry to bake without rising
Dough	A mixture of flour and liquid and other products. Dough can be fermented or non-fermented
Doyle	Fancy lace mat on which goods are presented
Dredge	To sprinkle or coat with flour or sugar
Emulsifying agents	Substances such as gums, agar, lecithin that aid in mixing two immiscible liquids such as oil and water
Enrobe	Coating chocolate with melted chocolate or icing
Entremets	Sweet course in French classical menu
Essences	Aromatic compounds used for flavouring pastry products
Fermentation	The action of yeast with sugar that produces carbon dioxide and alcohol. The CO ₂ is responsible for expansion of the dough
Filigree	Piped laces of chocolate or royal icing used for decoration purpose
Folding	Method of gently combining fragile ingredients
Fondant	Icing made from boiled sugar and liquid glucose and then agitated to form a homogeneous mass of minute crystals
Frosting	To coat a cake with icing, usually of whipped cream or cheese
Ganache	Paste made from a mixture of fresh cream and chocolate
Gelatin	Transparent protein made from animal bones and tissues that melt with hot liquids and form a jelly when cold
Glace	Ice or ice cream in French
Glazed	Coating with a gel or sugar to give a smooth and shiny surface
Gliadinin	One of the proteins present in flour
Glutenin	One of the proteins present in flour
Glycerin	Sweet, odourless, and colourless liquid syrup used in cake mixtures to extend shelf life
GMS	Glycerol mono stearate, an emulsifier that helps to distribute fat evenly through a product and helps to stabilise an emulsion
Gum Arabica	Sticky substance obtained from the acacia tree that hardens on exposure to air
Gum Tragacanth	Gum obtained from tragacanth plant, used as an ice cream stabiliser, for thickening of creams, jellies, and pastes and for stiff royal icings
Hulling	A process of removing calyx from strawberries, raspberries, etc.
Humidity	The amount of moisture present in air and crucial to making of breads, production of chocolate, and sugar work
Hydrogenated fats	Oil hardened with addition of hydrogen, for example, margarine
Hygroscopic	Property of attracting moisture
Kneading	Mechanical action applied for formation of dough
Leavening	Addition of yeast or aerating agent to dough to help it to rise in favourable conditions

(Contd)

Table 1.1 (Contd)

Term	Description
Macerate	To flavour foods by steeping them in aromatic liquids such as liquors
Marinate	To place food into oil, liquid, herbs, and spices to flavour it or tenderise it
Marsala	Fortified wine made from grapes grown near Marsala (Sicily)
Marshmallow	Elastic spongy sweet made from sugar, egg whites, gelatin, and liquid glucose
Marzipan	A paste made from ground almonds and sugar
Masking	Act of covering with icing, cream, marzipan, fondant, etc.
Nappe	To coat foods evenly with sauce
Overrun	The increase in the volume of an ice cream resulting from incorporation of air
Panada	A thick roux or sauce for basis of soufflé
Patisserie	The department which makes pastry preparations. Also applies to the art of pastry cook and the place where the pastry goods are prepared or even displayed
Pectin	A substance obtained from fruits and used in setting jellies and jams
Persipan	Paste made from stone fruit kernels and sugar. A cheaper substitute to marzipan
Pinning	Rolling out a pastry or dough with a rolling pin
Pith	The whitish cellular lining under the skin of citrus fruits
Plaiting	Weaving a rope of dough, paste, boiled sugar, etc., into orderly shapes
Praline	Caramelized mixture of almonds and sugar that is either crushed or ground into a paste. Since these pastes are used as fillings in moulded chocolates, it is a common word also used for small moulded chocolates
Prove	A term used to describe the fermentation of dough with action of yeast which results in doubling the volume of the dough
Prover	A temperature and humidity controlled equipment that is used for proving the dough
Puree	A smooth thick pulp or paste prepared from soft fruits or vegetables
Royal icing	Icing made from egg whites and icing sugar, often used for filigree work
Sabayon	A mixture of egg yolks, sugar, and liquid whipped together to a ribbon consistency over a double boiler
Salpicon	A mixture of diced fruits
Sorbet	Frozen and churned dessert of fruit and juice
Sorbetiere	An ice cream machine used for churning ice creams or sorbets
Steep	To immerse the food item in hot or cold liquid and leave it to stand in it for considerable amount of time either to infuse flavours, extract colour or soften a product
Syneresis	Also known as weeping of proteins. This happens when the protein is over heated and starts to loose water
Syrup	A syrupy sweet liquid made by boiling sugar and water
Texture	The mouth feel of a product when eaten
Viscosity	The degree to which a liquid resists flow under applied force
Vol au vent	A puff pastry case, usually open in centre, which is filled with savoury mixtures
Zest	Outer skin of citrus fruits that is used for flavouring

SECTIONS OF PATISSERIE

The size of a pastry kitchen can vary from one hotel to another and its sections will depend upon the kind of operations and the magnitude of business. For example, there is no requirement of a separate chocolate room, if there is no pastry shop or requirement of chocolate products is limited on the menu.

The pastry kitchen like the main kitchen is divided into two broad sections namely bakery and pastry. The bakery usually is limited to production of breads and contains an oven where all baking activities are carried out. The pastry section on the other hand is temperature controlled as this section largely deals with eggs, dairy products, chocolates, and other high risk food items that need to be protected from bacterial contamination.

Various sections of bakery include:

Breads section All types of dough and breads are made and baked here. The laminated breakfast rolls such as croissant and Danish may be prepared in the pastry section, but are eventually baked in the bakery section. The ovens are usually placed in this area, so that the heat does not affect the temperature of the pastry kitchen. The breads made here are supplied to restaurants, other kitchens as well as for selling through pastry shops.

Pastry section As discussed earlier, this section of the department is air conditioned to maintain cooler temperatures. This is done not only for protecting food from getting spoilt, but certain products in pastry kitchen such as whipped cream and chocolates need a specific temperature for correct applications.

This section makes various types of bases and fillings for cakes and pastries and makes cakes, pastries, and other products related to these for restaurants, buffets, banquets as well as pastry shops.

Puff section This section does all the laminated doughs such as puff, croissant and makes basic pastes such as sweet paste. This section also makes various products such as vol au vents, savoury quiches, and pies. This part of the pastry kitchen is a highly skilled job and croissants are one of the most important products of any hotel. Many guests judge the stature of the hotel from the quality of croissants produced by that hotel. This section produces laminated products, related dough, and pastes for all sections of pastry. Whether the pastry section requires a puff pastry base for its cakes or the dessert section needs something for making desserts, this section will make products for them.

Dessert section This section produces desserts for both banquets and restaurant buffets as well as à la carte. However, this section gets supported by the pastry section as well, which produces cakes and pastries for buffets. As we can see that all the sections of bakery and pastry are interdependent therefore, a close coordination is required between all the sections of this kitchen. The person in charge of the dessert section may need bread from the bakery section to make desserts such as summer pudding, bread and butter pudding, or may need sponges and fillings that are made by the pastry section.

Chocolate room This is a very specialised section in the pastry kitchen. All the work related to chocolates such as making chocolate garnishes, room amenities, and showpieces for display is done here. This area is usually a separate area as it has to be maintained at a temperature of 18-20°C with relative humidity at around 50%. This environment is most suitable for producing good quality chocolates. All the sections of the kitchen such as the dessert section or the pastry section rely on this area for chocolate products and garnishes. This section also has sophisticated machinery depending upon the size of the operations.

HIERARCHY IN KITCHEN

Figure 1.1 depicts the typical hierarchy of a large hotel which has well defined sections. However in many smaller scale hotels, there could be one pastry chef and few other multiskilled people who would be rotated in the department on rota basis. Pastry is a highly technical and specialised field, and getting the right talent for this section of the kitchen has always been a challenge for both the HR department and the executive chef.

Let us now discuss about the roles of these positions in the pastry kitchen.

Pastry chef As the name suggests, he/she is a person who is in charge of the bakery and pastry kitchen. As this department is a highly specialised department with regards to its production schedules and modern and sophisticated machinery, the pastry chef has a crucial role to play in managing his/her department effectively. He/she is responsible for all hot and cold desserts.

It may be cakes, pastries, ice creams, creams, etc. In most of the hotels, the pastry chef reports directly to the executive chef and is one of the most senior persons in the kitchen hierarchy. His job is to ensure that the department operates smoothly delivering consistent high quality products all through the year. No festivity is complete without desserts and that is the reason why this department is very busy throughout the year. Festivities such as new year's, Christmas, Valentine's, and Easter are the busiest seasons for the pastry department, and the pastry chef is responsible for planning the festive menus, staffing and even the budgets of the department.

Boulangier He is the baker who works under the pastry chef and is responsible for all the baked products such as breads and breakfast rolls for the restaurant outlets, pastry shops and even banquet parties. Baking breads is an art and high quality breads are the most important part of any meal starting from breakfast early in the morning. The bakery section being a hot kitchen is usually a separate room from the main pastry kitchen as it contains ovens that produce heat.

Dessert chef A dessert chef prepares basic creams such as whipped creams, pastry cream, bases such as sponges, short crust, and sable, and fillings such as ganache and mousses for various desserts. He/she

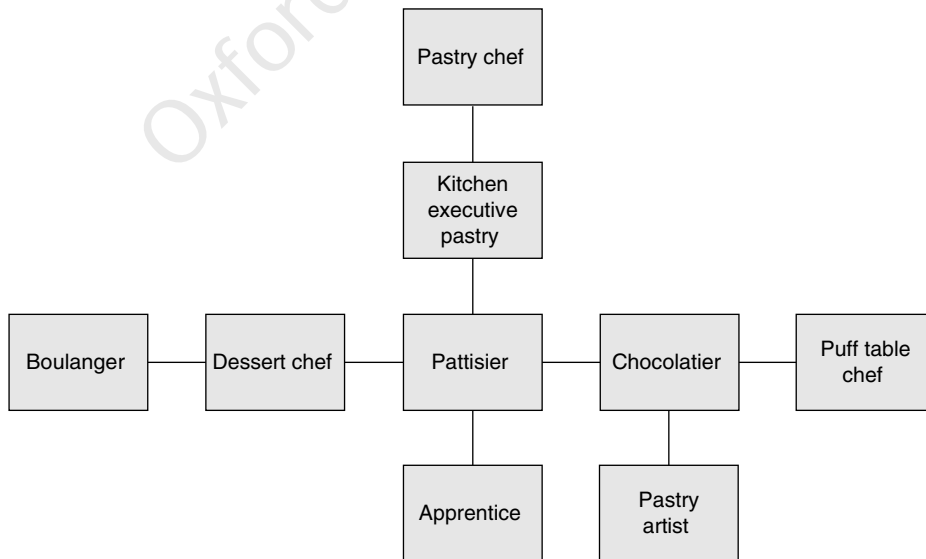


Fig. 1.1 Hierarchy of pastry kitchen

is also responsible for making ice creams and sorbets that are used in various outlets. The dessert chef works in close co-ordination with the cake and pastry chef as they both are interdependent upon each other. In smaller hotels, both these sections are usually taken care of by a single chef, who is responsible for preparing desserts for buffet, banquets and even à la carte.

Pâtisier This is a French word for cake and pastry person. The modern style cakes are known as entremets but this word should not be confused with a chef called *entremetier*, who is responsible for preparing vegetables in the hot kitchen. The person in-charge of the patisserie section is responsible for preparing various cakes and pastries for guest orders, dessert buffets for restaurant and banquets and even for à la carte portions.

Chocolatier The chocolatier of the kitchen makes all products related to chocolates. This section is also one of the busiest sections in festive season as all kinds of chocolate bonbons, chocolate garnishes and figurines, etc., are in high demand during this season. This section also usually has a kitchen artist, who makes sculptures and showpieces with chocolates and sugar.

Puff table chef This person is usually a part of boulanger or the baker and is responsible for preparing laminated pastries such as croissant, Danish, puff pastry, and the dough for breakfast rolls such as doughnuts and brioches. We will discuss more about these products in the forthcoming chapters.

WEIGHTS AND MEASUREMENT

Weights and measurements are one of the most important aspects of the pastry kitchen. Unlike other areas of kitchen where recipes are used as inspiration and not really measured to the last gram, in pastry it is the other way around. A few grams of ingredients can change a product's texture and appearance completely.

In any given recipe, you would need either weight or mass of a solid ingredient or the volume of a liquid. Gas is rarely measured and used in cooking, therefore, we will leave this part out and discuss largely weights and volume.

Sweet Paste Recipe

Refer to the following basic recipe of a basic pastry product called sweet paste for a better understanding of weights and measures.

Table 1.2 Ingredients for the recipe and their measurement

Name of ingredients	Metric	Imperial	Volumetric
Flour	400 g	1 lb	3 cups and 2 tbsp
Butter	200 g	8 oz	1 and half cup
Caster sugar	100 g	4 oz	1/2 cup
Eggs	100 ml	4 fl oz	2 numbers

Method

1. Cream butter and sugar until pale white in colour, in a bowl fitted with flat beater attachment. Add eggs little by little allowing them to emulsify.
2. Remove from the machine and incorporate flour with spatula taking care not to over mix the paste.
3. Flatten the paste onto a clean tray lined with a plastic film.
4. Cover the paste with a plastic wrap and chill it in refrigerator for a couple of hours.
5. Use as required.

As you can see in the aforementioned recipe, there are three types of measuring systems—Metric, Imperial, and Volumetric. In India, we usually follow the Metric system of weights however in most of the Europe, Imperial system of weights is more prominent. Americans usually follow the Volumetric system of measurement, where the ingredients are measured in cups and spoons.

It is also important to know the degree of temperature required for baking and we shall also discuss the conversions of Fahrenheit to Celsius and vice versa. But first let us discuss the weights.

Types of Measuring Systems

In this section, we will discuss the Metric and Imperial measuring systems in detail.

Metric System

Table 1.3 Weights

Name	Abbreviation used
Gram	g
Kilogram	kg

1 kg = 1000 g; 1/2 kg = 500 g; 1/4 kg = 250 g

Table 1.4 Capacities

Name	Abbreviation used
Millilitre	ml
Decilitre	dl
Centilitre	cl
Litre	lt

1 lt = 1000 ml; 1/2 lt = 500 ml; 1/4 lt = 250 ml; 1 dl = 100 ml; 1 cl = 10 ml

Imperial System

Table 1.5 Weights

Name	Abbreviation used
Ounce	oz
Pound	lb

16 oz = 1 lb; 8 oz = 1/2 lb; 4 oz = 1/4 lb

The ounce can be further divided into 3/4 oz, 1/2 oz, and 1/4 oz.

Table 1.6 Capacities

Name	Abbreviation used
Fluid ounce	fl oz
Gill	gill
Pint	pt
Quart	qt
Gallon	gal

1 gal = 8 pt or 4 qt or 160 fl oz; 1/2 gal = 4 pt or 2 qt or 80 fl oz; 1 qt = 2 pt or 40 fl oz; 1 pt = 20 fl oz; 3/4 pt = 15 fl oz or 3 gill; 1/2 pt = 10 fl oz or 2 gill; 1/4 pt = 5 fl oz or 1 gill

Oven Temperature Comparisons

The temperature of the oven is either used in Fahrenheit also written as F or in Celsius written as C. To convert C into F, multiply by 9, divide by 5 and add 32. For example, to change 204°C into °F, we will use the following formula.

$$204 \times \frac{9}{5} + 32 = 399 \text{ (400°F)}$$

To convert F into C, subtract 32, multiply by 5 and then divide by 9. So now to convert 400°F in C, we will use the following formula.

$$400 - 32 \times \frac{5}{9} = 204.44^{\circ}\text{C}$$

In few ovens, the knobs are set to various markings such as 1/8, 1/4, 1/2, 1 and so on. These settings correspond to a particular temperature as listed in Table 1.7.

Let us see the following table to understand the various degrees of temperature and its uses.

Table 1.7 Degrees of temperature and its uses

Gas mark	Centigrade	Heat range	Uses
1/8	80–90	Very cool	Meringues and dehydrating
1/4	115–116	Cool	Dry roasting of nuts and spices
1/2	130–131	Slow cooking	Nut and meringue based sponges like japonaise
1	142–144	Slow cooking	Baked custards and creams
2	155–156	Moderate cooking	Macaroons
3	165–168	Moderate cooking	Biscuits, sponges, and cookies
4	178–181	Medium	Choux pastries
5	190–193	Medium hot	Flans, tarts, and pies
6	200–204	Hot	Soufflé
7	218–220	Hot	Cones, yeast goods, puff paste
8	228–230	Very hot	Swiss rolls
9	240–244	Very hot	Breads and rolls
10	258–260	Extremely hot	Breads and rolls

LAYOUT AND WORKFLOW

As we have read before that this is one of the busiest kitchens in a large hotel, it is important to have the layout and organisation of equipment in the most thoughtful manner, so that the department works efficiently and produces products of high quality. All the sections such as bakery, pastry and their sub sections such as dessert table, puff table, and à la carte are carefully planned and laid out. There is a separate chocolate room which produces chocolates and garnishes and a separate artist room that can be used for making artistic showpieces like sugar sculptures that do not need a temperature controlled environment.

Figure 1.2 depicts the layout of a bakery and confectionary of a large hotel. The areas are well laid out in a way that there is not much of walking around and the operations can be carried out smoothly, with sections of the pastry kitchen coordinating with each other.

The bakery area is separated from the confectionary, as the latter is air conditioned and the bakery area could be warm due to the heat expelled from the ovens. However, some modern oven ranges like combination ovens have sorted this problem, whereby the heat is not spread around too much. But still in case of bakery, the yeast leavened products need a certain kind of temperature, between 25–30°C, in order to ferment and double in volume.

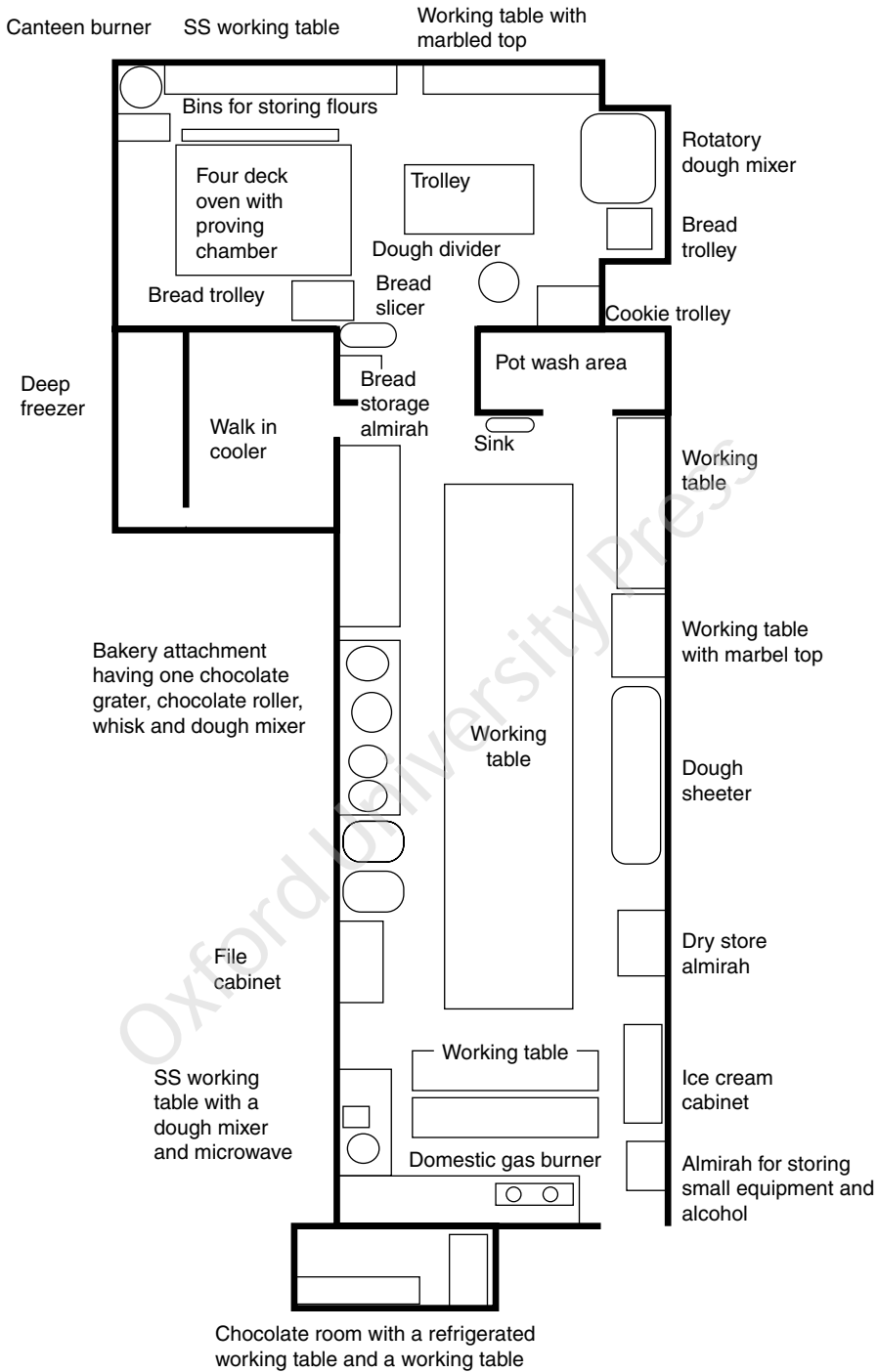


Fig. 1.2 Layout of a bakery and confectionary of a large hotel

The chocolate room is also a separate area as the temperature needs to be maintained between 18-20°C with a relative humidity of 50%. In some regions where humidity levels are high, equipment such as dehumidifiers are installed to maintain the humidity levels at a required setting.

Areas such as puff table are also part of the pastry kitchen, as the laminating of dough requires butter to be layered between the layers of dough and hence, the lower temperatures are essential to lock the butter in the dough and prevent it from softening and oozing out whilst laminating.

LARGE MACHINERY USED IN BAKERY AND PASTRY

Bakery and confectionary host a range of sophisticated equipment as it is a specialised area of kitchen. Though much smaller equipment is used for doing daily jobs, from Table 1.8, we will get to know some of the large machineries and equipment used in bakery and confectionary.

Table 1.8 Large machinery used in bakery and confectionary

Machinery	Description
Ovens Other names: Batch ovens, rotator ovens	Ovens are traditionally used for baking purposes and they come in various shapes and sizes. The type of the oven largely depends upon the kind of operations. In large operations, where the baked products are required to be made in bulk, large rotator ovens are a good choice. There are also large ovens with automatic feeding belts, where entire batches of products are loaded and removed from the oven with the help of an automatic feeder. Such an oven is known as batch oven as big batches of products are baked in it.
Convection ovens Other names: Combi ovens	These ovens come in various sizes and work on the principle of circulation of hot air. Some models are also available with roll-in trolleys that can be loaded and rolled inside the cabinet. This equipment comes very handy in cooking as well as reheating of food. They are called combi ovens as they have the facilities of moist as well as dry heat.
Pizza ovens	These ovens are different from regular ovens as they are used mostly for baking pizzas only. These are available in various sizes. The height of the deck of these ovens is as low as eight inches so that a pizza can be slipped into it by using a long shovel known as pizza bat. The floor of this oven is usually made of stone so that it gives a rustic look to the pizza.
Walk-in Other names: Cold storage room	Walk-ins are refrigerated compact areas where one could walk inside and hence the name walk-in. They can be custom made to any size to be suited for an operation. One could have walk-in refrigerators or freezers depending upon the requirement. Certain companies are now specialising in modular shelving so that the storage of food can be as per the food safety norms and Hazard Analysis and Critical Control Points (HACCP).
Freezers Other names: Deeps	Freezers are a very important part of any bulk cooking operation. As quantity cooking involves planning and advance <i>mise en place</i> , we need ample refrigerated space to store the same until it is ready for cooking. These are available in various sizes depending upon the requirement. You could have roll-in trolley style or the ones which have shelving. The deep freezers are used in pastry kitchen for storage and also many products need prior freezing before any other application is carried out. For example, an entremet has to be frozen, before it can be glazed or sprayed with cocoa butter.

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Table 1.8 (Contd)

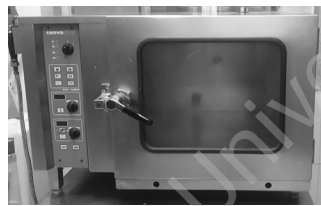
Machinery	Description
Blast chillers/Freezer Other names: Blast chilling units	Blast chillers and freezers are one of the most important equipment used in pastry operations for modern cakes and pastries. Blast freezers allow the cakes and pastries to freeze quickly so that they can be glazed or sprayed depending upon the finish required.
Deep fat fryers Other names: Deep frying unit	Deep fat fryers are safer in bulk cooking for deep frying as they are available from small table top models to large ones that can hold up to 30 litres of oil. It is always safe to use deep fat fryers rather than open pots and <i>kadhai</i> whilst frying in large quantities. Deep fat fryers are commonly used for frying doughnuts and other fried products used in bakery and confectionary.
Flour sieves Other names: Sifter	As the name suggests, this equipment is used for sifting flour. It is electrically operated and can sift large quantities of flour in less than a minute. It comes in very handy as it saves time and avoids too much handling of the raw commodity.
Dough mixers Other names: Planetary dough mixer/Spiral dough mixer	Dough mixers are available in various sizes and one could chose depending upon the size of operation. Some dough mixers can easily knead up to 100 kg of flour and even more. This machine comes in handy when one has to produce breads in bulk.
Table top mixers Other names: Universal dough mixer	Some table top models are very important to do mixing and whipping of meringues for smaller batches as well. These small dough mixers come with attachments such as beater, paddle, and balloon whisks and can be used for kneading small quantities of dough, batters or whipping creams and meringues.
Dough divider Other names: Dough cutter	As the name suggests this equipment is used to divide the dough. Some models also help to shape the rolls. Usually, a standard model divides the dough into 36 pieces. So if we want each roll to be of 50 g we would scale the dough of 1800 g. This when divided into 36 pieces will yield a roll of 50 g and so on. This saves time and also helps to maintain the costs as the yield is same every time.
Proving cabinets	It is a cabinet with water being heated with an element. Electric, gas, and pressure steam models are available. It maintains the temperature of 25°C and humidity of 90% and is used for proving breads.
Retarder proofer	Retarder proofer is a very helpful equipment used in bakery operations involving yeast leavened products. It can be timed for around 24 hours, where the products will freeze, thaw, and proof as per the programme set. This is quite a helpful equipment in bulk production.
Dough sheeter Other names: Sheeting machine	Dough sheeter is commonly used in bakery kitchen and helps to roll out the dough for fabricating breads. It comes in various sizes and one can choose depending upon the kind of operation.
Ice cream machine Other names: Sorbetiere	These can be table top models or floor mounted depending upon the volume of business. The ice cream mix is poured in the machine and it churns the mixture whilst continuously freezing it, thereby preventing crystal formation and hence, preparing a smooth ice cream or sorbet.
Chocolate tempering machine Other names: Tempering machine	These are commercially available machines that work on temperature control. The machine automatically melts the couverture to 40°C and then cools it down to 28°C until all the good crystals are formed. The machine then brings the temperature to the working temperature, which is different for each kind of couverture. This machine can be programmed according to the specific requirement of the chocolate. The paddle in the chocolate tempering machine keeps stirring the chocolate constantly and this ensures that each particle of chocolate has been evenly melted.

Table 1.8 (Contd)

Machinery	Description
Chocolate guitar Other names: Guitar	This equipment is used for cutting a square piece of set ganache into equal and neat pieces. As this equipment uses stainless steel chords of a guitar hence the name.
Bread slicing machine Other names: Bread slicer	This is an important equipment in bakery and is used for slicing bread loaves for toasts and sandwich preparations. This equipment saves time whilst slicing breads and gives uniform slices.
Chocolate shaving machine	This machine is used in places where there is a large requirement of chocolate flakes. In this machine, a block of chocolate is secured in a place that moves to and fro over a sharp blade to scrape the chocolate very thinly to make chocolate flakes. These flakes should be hardened in the fridge and should be handled very carefully as they will melt from the heat of the palm if handled for too long.
Chocolate spray gun	This is an atomiser kind of an apparatus attached to a compressor. The jar holds melted chocolate mixed with melted cocoa butter and is sprayed onto chocolate figures to give a matte kind of finish.



Batch oven



Convection oven



Pizza oven



Walk-in



Freezer



Blast chiller/Freezer



Deep fat fryer



Spiral dough mixer



Table top mixer

Fig. 1.3 Large machinery used in bakery and confectionary (Contd)



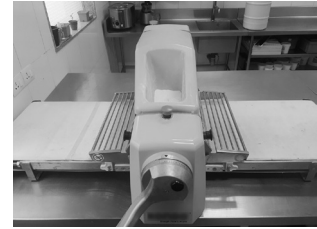
Dough divider



Proving cabinet



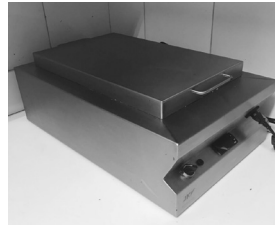
Retarder proofer



Dough sheeter



Ice cream machine



Chocolate tempering machine



Bread slicing machine



Chocolate spray gun

Fig. 1.3 Large machinery used in bakery and confectionary

Apart from these, small tools and equipment are widely used in bakery and confectionary to carry out daily jobs. Some of the most common ones are discussed in Table 1.9.

Table 1.9 Small equipment used in bakery and confectionary

Small equipment	Description
Sieve	Drum sieve is mostly used to sieve flours and the size of the mesh through which the flour will be sieved will depend upon the type of flour being used.
Weighing scale	Preferably a digital weighing scale is better, as the accuracy of the ingredients is very important.
Baking trays	Often known as sheet pans, they can be of iron or Teflon, coated for non-stick.
Bread moulds	These are containers of various shapes and sizes and are often sold by the volume they are intended for. So one can easily procure moulds of 1 lb, 2 lb, etc.
Dough scorers	A piece of equipment having a sharp surgical blade in the end, to score the breads at an angle before baking.
Dough scrapers	Available in plastic or steel, they are used to scrape dough and also to cut it for scaling.
Bench brush	A large hard bristle brush to clean the table top and to brush away excess flour.
Spray bottle	It is used for spraying water onto the breads, if the ovens are not equipped with steam injections.
Cake moulds	Available in various shapes and sizes, they are used for baking cakes. Traditionally cake moulds are round, but now a day's various shapes such as triangles, ovals and even pyramids are available.

Table 1.9 (Contd)

Small equipment	Description
Tart and flan moulds	These are available in various shapes and sizes such as boat shapes, square, round, and fluted. These moulds are used for preparing tart, pies, and flans.
Cutters	Various types of cutters are used in bakery and pastry. They can be of various shapes and sizes and are used for making cookies and biscuits. Few cutters such as doughnut cutter is typically used for cutting doughnuts.
Savarin mould	A mould used for making Baba au rhum. The hole in the centre of the cake is filled with fresh fruits after baking.
Tube shaped round mould	It is used for baking angel food cakes and chiffon cakes. The mould is seldom greased for a better finish and hence, it will be advisable to use non-stick moulds.
Serrated knife	It is used for slicing sponges into layers, which can then be layered with assorted fillings to create cakes and gateaux.
Palette knives	A flat knife used for icing the sponges. They can be straight or angular and are available in various sizes.
Piping bags and nozzles	Made from material similar to that of shower curtain, piping bags are used to pipe designs on top of cakes to decorate them.
Turn table	Also called Lazy Suzanne or cake turn table, it is used for icing and finishing the cakes. It rotates on an axis thereby allowing the chef to evenly spread the cream and other fillings with ease. It is available in metal and plastic as well. Today many manufacturers are making motorised cake turn tables.
Flat paddle	An attachment of a dough mixer, it is used for creaming butter and sugar to make sponges by creaming method.
Balloon whisk	A balloon shape wire whisk used for whipping the ingredients.
Wire racks	A piece of equipment used for cooling the baked goods.
Silpat	These are non-stick silicone baking sheets used for baking things that tend to stick on other surfaces.
Zesters	<p>Various kinds of graters are used in pastry and bakery kitchen to extract the zest from citrus fruits. Some of the common ones used are:</p> <p>Micro plane grater: Micro plane graters have a sharp tooth and their sleek shape helps to maintain a grip whilst grating spices such as nutmeg.</p> <p>Zester: As the name suggests, this tool is used for removing zest from citrus fruits such as lemons and oranges. This has a slightly curved tip with sharp holes in it, which removes the zest without any bitter pith attached to it.</p> <p>Channeller: Channel knife is a kind of small peeler that has a curved V shape at the tip or sometimes on the side. It helps to remove a thick strip from the sides of the citrus fruit. The fruit is then sliced and this yields decorative slices.</p>
Utility tools	<p>These are a range of tools used in pastry kitchen for various kinds of jobs. These tools not only help to do the job efficiently but also help to get a consistent product. Some of such tools used are:</p> <p>Can and bottle opener: Pastry kitchen uses lots of canned and bottled items and this piece of equipment is very handy to open cans and tins. These are available in various shapes and sizes.</p> <p>Corers: As the name suggests, these tools are used for coring the central part of a fruit without cutting it open. This tool is used when we need the fruit intact or it needs to be cut into slices. Corers are used mainly for coring apples and pears and some large corers are also used for coring pineapples.</p> <p>Pitters: These small tools are the most important small tools used in pastry kitchen. They can be used for removing pits from stone fruits such as cherries and olives.</p>

(Contd)

Table 1.9 (Contd)

Small equipment	Description
Silicone moulds	Various companies around the world are manufacturing moulds in silicone that can withstand high temperatures. There are various benefits of using silicone moulds. They do not require greasing and the product does not get stuck to the base. Silicone moulds can be of various designs and shapes and they give a very modern look to the cakes and pastries. Silicone moulds can also be used for preparing garnishes such as caramel and chocolates.
Butane torches	These are small torch burners that get attached to a butane canister. They come in very handy to spot caramelize products. This tool has various uses, it can be used to extract chilled cakes out of the metallic moulds by heating the sides of the cake with the torch burner. It can be used for caramelizing sugar on many desserts such as crème brûlée.
Modelling tools	These are also known as marzipan tools as they are used mostly for making decorations from marzipan. They come in a set of various shapes and each tool has a specific usage. The tools are used for making flowers, figures, faces of living things, etc.
Combs	Various kinds of combs are used for creating designs on the sides or top of the cake. Combs are available in various materials such as metal, plastic or high grade silicon rubber. These combs are used for preparing various garnishes for cakes and pastries.
Printing apparatus	This is a fairly new piece of equipment added to the confectionary world. It is a normal inkjet printer to print computerised images on a special edible paper made from rice. Edible food coloured cartridges are used for this purpose. Any design can be printed on these sheets and the same can be placed on top of cakes or pastries.
Confectionary funnel	This piece of equipment is commonly used in confectionary to fill liquid ganache into moulded chocolates whilst making pralines and truffles.
Expandable trellis cutter	Small steel discs with sharp edges are mounted on metal bars that can be stretched and closed to arrange the distance between the rollers. This equipment is used for cutting dough and marking the lines for cutting rectangular blocks of pastries.
Chocolate thermometer	A chocolate thermometer is available in various shapes and materials. The grading on this thermometer corresponds to the various degrees required by a particular kind of chocolate. It also has markings which display the correct working temperature of a chocolate. It is also available in digital mode.
Moulds	These are poly carbonate plastic moulds available in various shapes and designs, commonly used for making moulded chocolates. Some moulds such as eggs and spheres are moulded and stuck together, whereas some moulds of figures, when joined together have an opening from where the excess chocolate can be poured out, when making moulded chocolates.
Scrapers and spatulas	The most important tool that a pastry chef cannot do without is a flexible plastic scraper or a spatula. These are used for mixing and removing items from one bowl to another.



Sieve



Weighing scale



Baking tray

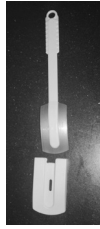
Fig. 1.4 Small equipment used in bakery and confectionary



Bread moulds



Dough scorer



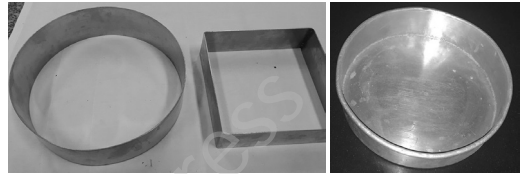
Dough scraper



Bench brush



Spray bottle



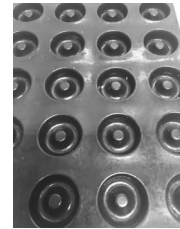
Cake moulds



Tart and flan moulds



Cutters



Savarin mould



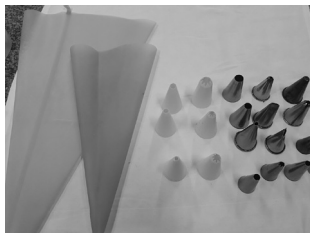
Tube shaped round mould



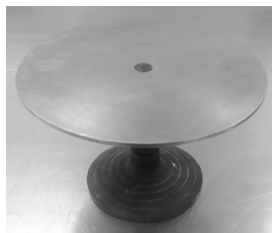
Serrated knives



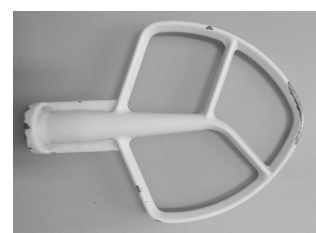
Palette knives



Piping bags and nozzles



Turn table



Flat paddle

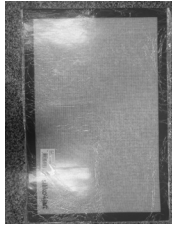
Fig. 1.4 Small equipment used in bakery and confectionary (Contd)



Balloon whisk



Wire racks



Silpat



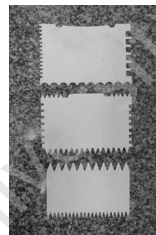
Silicone moulds



Butane torch



Modelling tools



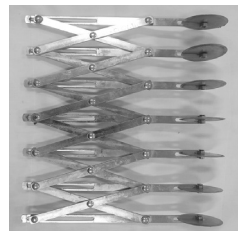
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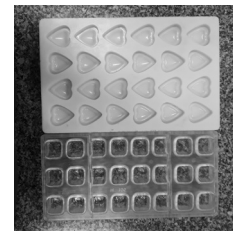
Printing apparatus



Confectionary funnel



Expandable trellis cutter



Moulds



Scrapers and spatulas

Fig. 1.4 Small equipment used in bakery and confectionary

These are some of the most common tools and equipment used in bakery and pastry and the list is endless. Modernisation has created many choices of unique tools and equipment for pastry chefs that make their work easier and more efficient.

SUMMARY

This chapter dealt in basic introduction to the pastry and bakery department. It largely discusses the ideal set up of a pastry kitchen in a large hotel with full-fledged pastry operations, which include a pastry shop outlet attached to it where the pastry goods are sold and also supplying to various restaurants and banquets of the hotel. Before we started to dwell into this department, it was important to know the key terms associated with bakery and pastry department and its operations, so that it will be easier to comprehend what will follow in this book. So we have discussed a range of key terms that will be very helpful for the students to understand the nitty-gritties of this department and its work.

Then we discussed various sections of the department as a whole and understood what is the role and function of the in charge of that particular section. We also discussed the coordination between the various sections in the kitchen and

how they are interdependent on each other for a smooth functioning of the department.

We also discussed the hierarchy of the department and reporting structures. The students will benefit from knowing the individual responsibilities of each position and the jobs that they are responsible for. This section also explains some French terms associated with the positions in the kitchen which are commonly used internationally.

We also threw light on the various systems of weights and measurements such as metric and imperial systems and how to convert them from one to another. In this chapter, we also discussed about the oven temperatures and how to convert from Fahrenheit to Celsius and vice versa.

We also discussed the layout of the kitchen, the large equipment and machinery as well as the small tools and equipment used in the pastry department.



KEY TERMS

A la carte A bill of fare, where dishes are mentioned along with their price

American system System of measurement where units such as cups and teaspoons are used

Baba au rhum French dessert made with yeast leavened dough that is baked in a savarin mould and then soaked in rum flavoured sugar syrup

Banquets Large gathering of people in a designated function area, where meals are served

Bon bon Small bite size chocolate preparations, usually round in shape

Bread and butter pudding Dessert made by soaking left over bread, butter, and custard and then baked

Buffet Arrangement of food for self service

Croissant Laminated breakfast pastry

Danish Laminated breakfast pastry glazed with jam

Dehumidifier Equipment used for controlling humidity in an area

HACCP Short form of Hazard Analysis and Critical Control Points, which is a food safety management system

Imperial system System of measurement where units such as pound, ounce, and pints are used

Lamination Layering of fat and dough in such a manner that there are alternate layers of fat and dough

Metric system System of measurement where units such as kilograms, grams, and litres are used

Mise en place French word for pre preparation required before the actual cooking of the meal

Quiche Custard based, baked preparation of meats or vegetables, in a tart or a pie shell

Savoury Salted products made in kitchen that are eaten as snacks

Summer pudding Dessert made with stale bread and berries



OBJECTIVE TYPE QUESTIONS

1. What is entremets?
2. Define blind baking.
3. What is a couverture?
4. Differentiate between caramelization and crystallization.
5. What are emulsifying agents?
6. Define frosting.
7. What is proving?
8. Define syneresis.
9. What is a vol au vent?
10. Who is a Boulanger?
11. What are the two systems of measurement?
12. What are the two units in which temperature is often measured?
13. What is an oz?
14. How much would one decilitre be with regards to millilitres?
15. How much is 1 gallon with regards to quart?
16. What is a Sorbetiere?
17. Define retarder prover.
18. What is a chocolate guitar?
19. Name two types of ovens used in bakery.
20. Name the equipment that is used for portioning the dough into small portions.



ESSAY TYPE QUESTIONS

1. What do you understand by kitchen layout? Describe various sections of pastry kitchen.
2. What is the importance of a chocolate room and why is it a separate area?
3. Describe the puff section and the work carried out there.
4. Describe the hierarchy of the pastry kitchen and its reporting structure.
5. What is the importance of using machinery in pastry kitchen? List any five large machineries and two small tools and describe their uses and how they will help to do the job efficiently.



ACTIVITY

1. In a group of 4 to 5 students, visit a hotel and study the layout of its pastry kitchen with regards to its food style and service. Critique the layout and offer necessary solutions.
2. Visit at least 3-4 pastry shops and list down the names of products. Now in groups identify which product was made in which section of the kitchen.
3. Make a chart of conversions for weights and measures and prepare a table depicting conversions from metric to imperial system. Laminate and put up in your kitchen for future reference.
4. In groups of 3-4, measure the most commonly used ingredients in pastry kitchen such as flour, sugar, milk, and cream, and weigh them in cup measures. Then weigh each one to prepare a chart of cup to metric conversion. This will help you to identify what is the weight of one cup of sugar to one cup of flour.