



# Bakery-I

*Students Handbook and  
Practical Manual*

**CLASS - XI**



**CENTRAL BOARD OF SECONDARY EDUCATION**

2, Community Centre, Preet Vihar, Delhi-110092



# *Bakery-I*

*Students Handbook and*

*Practical Manual*





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*Students Handbook*

**CLASS-XI**



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2, Community Centre, Preet Vihar, Delhi-110092



Bakery-I, Students Handbook & Practical Manual, Class-XI

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# भारत का संविधान

## उद्देशिका

हम, भारत के लोग, भारत को एक सम्पूर्ण <sup>1</sup> [ प्रभुत्व-संपन्न समाजवादी पंथनिरपेक्ष लोकतंत्रात्मक गणराज्य ] बनाने के लिए, तथा उसके समस्त नागरिकों को:

सामाजिक, आर्थिक और राजनैतिक न्याय,  
विचार, अभिव्यक्ति, विश्वास, धर्म  
और उपासना की स्वतंत्रता,  
प्रतिष्ठा और अवसर की समता

प्राप्त कराने के लिए

तथा उन सब में व्यक्ति की गरिमा

और <sup>2</sup> [ राष्ट्र की एकता और अखंडता ]

सुनिश्चित करने वाली बंधुता बढ़ाने के लिए

दृढ़संकल्प होकर अपनी इस संविधान सभा में आज तारीख 26 नवम्बर, 1949 ई० को एतद्वारा इस संविधान को अंगीकृत, अधिनियमित और आत्मार्पित करते हैं।

1. संविधान ( बयालीसवां संशोधन ) अधिनियम, 1976 की धारा 2 द्वारा ( 3.1.1977 ) से “प्रभुत्व-संपन्न लोकतंत्रात्मक गणराज्य” के स्थान पर प्रतिस्थापित।
2. संविधान ( बयालीसवां संशोधन ) अधिनियम, 1976 की धारा 2 द्वारा ( 3.1.1977 ) से “राष्ट्र की एकता” के स्थान पर प्रतिस्थापित।

## भाग 4 क

### मूल कर्तव्य

51 क. मूल कर्तव्य - भारत के प्रत्येक नागरिक का यह कर्तव्य होगा कि वह -

- (क) संविधान का पालन करे और उसके आदर्शों, संस्थाओं, राष्ट्रध्वज और राष्ट्रगान का आदर करे;
  - (ख) स्वतंत्रता के लिए हमारे राष्ट्रीय आंदोलन को प्रेरित करने वाले उच्च आदर्शों को हृदय में संजोए रखे और उनका पालन करे;
  - (ग) भारत की प्रभुता, एकता और अखंडता की रक्षा करे और उसे अक्षुण्ण रखे;
  - (घ) देश की रक्षा करे और आह्वान किए जाने पर राष्ट्र की सेवा करे;
  - (ङ) भारत के सभी लोगों में समरसता और समान भ्रातृत्व की भावना का निर्माण करे जो धर्म, भाषा और प्रदेश या वर्ग पर आधारित सभी भेदभाव से परे हों, ऐसी प्रथाओं का त्याग करे जो स्त्रियों के सम्मान के विरुद्ध हैं;
  - (च) हमारी सामासिक संस्कृति की गौरवशाली परंपरा का महत्त्व समझे और उसका परिरक्षण करे;
  - (छ) प्राकृतिक पर्यावरण की जिसके अंतर्गत वन, झील, नदी, और वन्य जीव हैं, रक्षा करे और उसका संवर्धन करे तथा प्राणिमात्र के प्रति दयाभाव रखे;
  - (ज) वैज्ञानिक दृष्टिकोण, मानववाद और ज्ञानार्जन तथा सुधार की भावना का विकास करे;
  - (झ) सार्वजनिक संपत्ति को सुरक्षित रखे और हिंसा से दूर रहे;
  - (ञ) व्यक्तिगत और सामूहिक गतिविधियों के सभी क्षेत्रों में उत्कर्ष की ओर बढ़ने का सतत प्रयास करे जिससे राष्ट्र निरंतर बढ़ते हुए प्रयत्न और उपलब्धि की नई उंचाइयों को छू ले;
- <sup>1</sup>(ट) यदि माता-पिता या संरक्षक है, छह वर्ष से चौदह वर्ष तक की आयु वाले अपने, यथास्थिति, बालक या प्रतिपाल्य के लिये शिक्षा के अवसर प्रदान करे।

1. संविधान ( छयासीवां संशोधन ) अधिनियम, 2002 की धारा 4 द्वारा ( 12.12.2002 ) से अंतः स्थापित।



# Preface

In an increasingly globalized world and the changing paradigm of urbanized living the demand for Hospitality and Tourism has increased manifold the world over. In this ever expanding sector, it has become essential to provide Competency based Vocational Education. It is in this context that CBSE has launched a course in Hospitality & Tourism under vocational stream. Taking cue from this need, a new course on Bakery and Confectionery is being launched that will help students to either join the industry after class XII or they can pursue higher education in this field.

The Students Handbook on Bakery-I attempts, to describe the aims & objectives of Bakery, Hygiene, Bread-making, Equipments used in Bakery.

The language used in this book is simple with lot of pictorial illustration. This book is a complete handbook for anybody to even start a small bakery. This book will help students by giving them information in accessible style.

Practicing professionals from the fields of Hospitality and Tourism comprised the team of authors for this book. The Board thankfully acknowledges their contribution in completing the book in record time. I hope this book will serve a useful resource in this subject.

The Board is grateful to the members of the Committee of Course for their advice, guidance and total commitment towards development of this course. We are indeed indebted to these academic advisors who have lent us the benefit of their rich and insightful experience. I would like to appreciate Vocational Education Cell, CBSE for coordinating and successfully completing the work.

Comments and Suggestions are welcome for further improvement of the Book.

**Vineet Joshi, IAS**  
Chairman, CBSE





# Acknowledgements

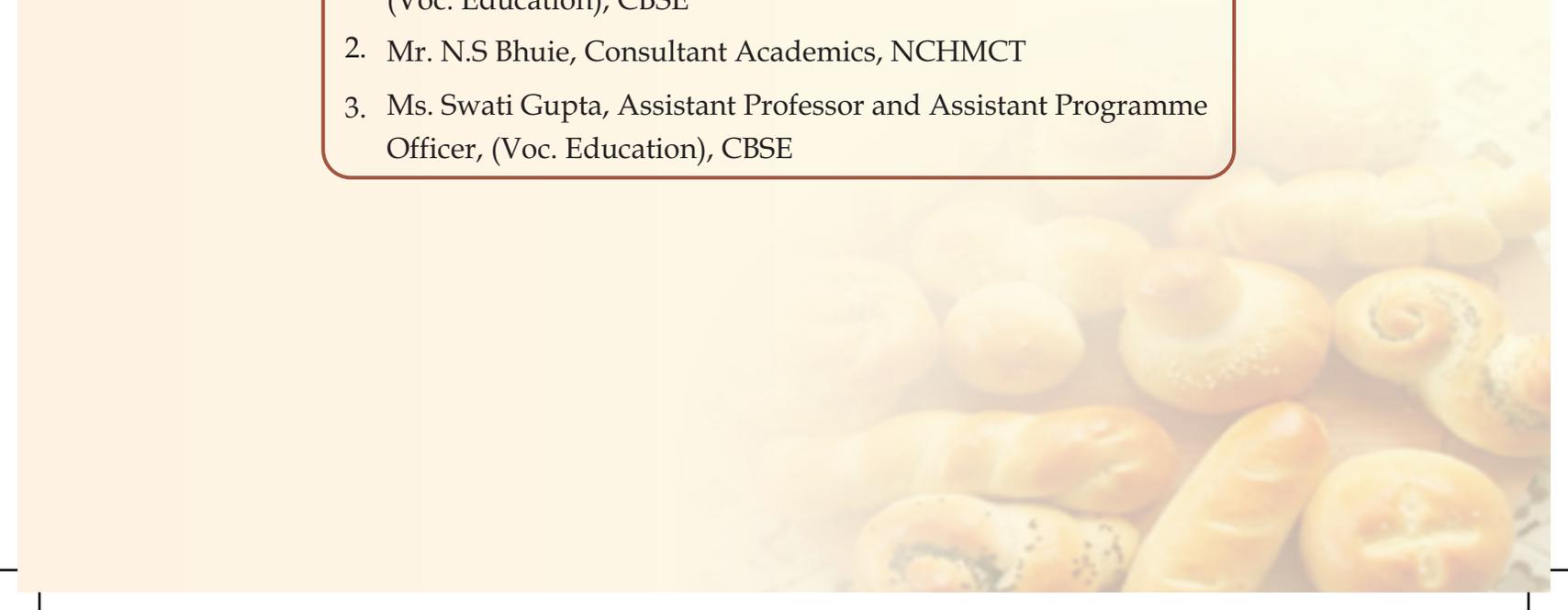
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# Bakery

TOPIC	LEARNING OUTCOMES
<b>CHAPTER 1 - INTRODUCTION TO BAKERY AND CONFECTIONERY</b>	
1.1 Introduction to Bakery and Confectionery	General Overview of Bakery and Confectionery
1.2 Scope of Bakery	To understand the Scope of Bakery
1.3 Organizational Structure	To study the Organizational Structure of the Bakery Department
1.4 Units of Measurements	To study the units of measurements used in Bakery
1.5 Bakery & Confectionery Terms	To learn the various Bakery & Confectionery Terms
1.6 Basic Equipments	To get familiarized with the equipments used in Bakery
1.7 Baking Temperatures for Bakery Products	To study the different Temperatures for Baking Products
<b>CHAPTER 2 - HYGIENE</b>	
2.1 Introduction to Hygiene	General Overview of Hygiene
2.2 Concept of Hygiene & its Importance in Bakery	To understand the Concept & Importance of Hygiene
2.3 Personal Hygiene	To understand the Importance of Personal Hygiene
2.4 Work Area Hygiene	To study the aspects of Work Area Hygiene
2.5 Basic First Aid	To learn the Basic First-Aid



<b>CHAPTER 3 - STRUCTURE OF WHEAT GRAIN</b>	
3.1 Introduction to Structure of Wheat Grain	General overview of Structure of Wheat Grain
3.2 Physical Structure	To learn the Physical Structure of Wheat Grain
3.3 Longitudinal Section	To study the Longitudinal Section of Wheat Grain
<b>CHAPTER 4 - MILLING OF WHEAT</b>	
4.1 Introduction to Milling of wheat	General overview of Milling of Wheat
4.2 Wheat Milling Process	To get familiarized with the Wheat Milling Process
4.3 Roller Flour Mills, Stone Mills	To know the Roller Flour Mills and Stone Mills
<b>CHAPTER 5 - FLOUR</b>	
5.1 Introduction to Wheat Flour	General Overview of Wheat Flour
5.2 Composition of Wheat Flour	To learn different components of Wheat Flour along with their percentages.
5.3 Types of Flour	To identify different Types of Flour
5.4 Grades of Wheat Flour	To identify different Grades of Flour
5.5 Water Absorption Power	To understand Water Absorption Power and WAP percentage of different flours
5.6 Gluten	To know the role of Gluten in Bread Making
<b>CHAPTER 6 - ROLE OF RAW MATERIALS USED FOR BREAD MAKING</b>	
6.1 Introduction to Role of Raw material used for Bread Making	General overview of Role of Raw material used for Bread Making
6.2 Essential: Flour, Salt, Yeast, Water, Sugar	To study the role of essential ingredients in Bread Making



6.3 Optional: Fats and Oils, Eggs, Bread Improvers, Milk	To study the role of optional ingredients in Bread Making
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**CHAPTER 7 - METHOD OF BREAD MAKING**

7.1 Introduction to methods of Bread Making	General overview of method of Bread Making
7.2 Straight Dough Method i. Salt Delay Method ii. No Time Dough Method	To understand the Straight Dough Method in bread making and its variations i.e. salt delayed method and no time Dough Method.
7.3 Sponge and Dough Method	To understand the Sponge and Dough Method used in Bread Making

**CHAPTER 8 - CHARACTERISTICS OF A GOOD BREAD**

8.1 Introduction of characteristics of a Good Bread	General overview of Characteristics of Good Bread
8.2 External : Volume, Symmetry of Shape, Bloom, Crust Colour, Evenness of Bake, Oven Break	To identify the external Characteristics of a Good Bread
8.3 Internal: Colour of Bread, Structure, Sheen and Texture, Flavour and Aroma, Crum Clarity, Moistness, Cleanliness	To identify the internal Characteristics of a Good Bread



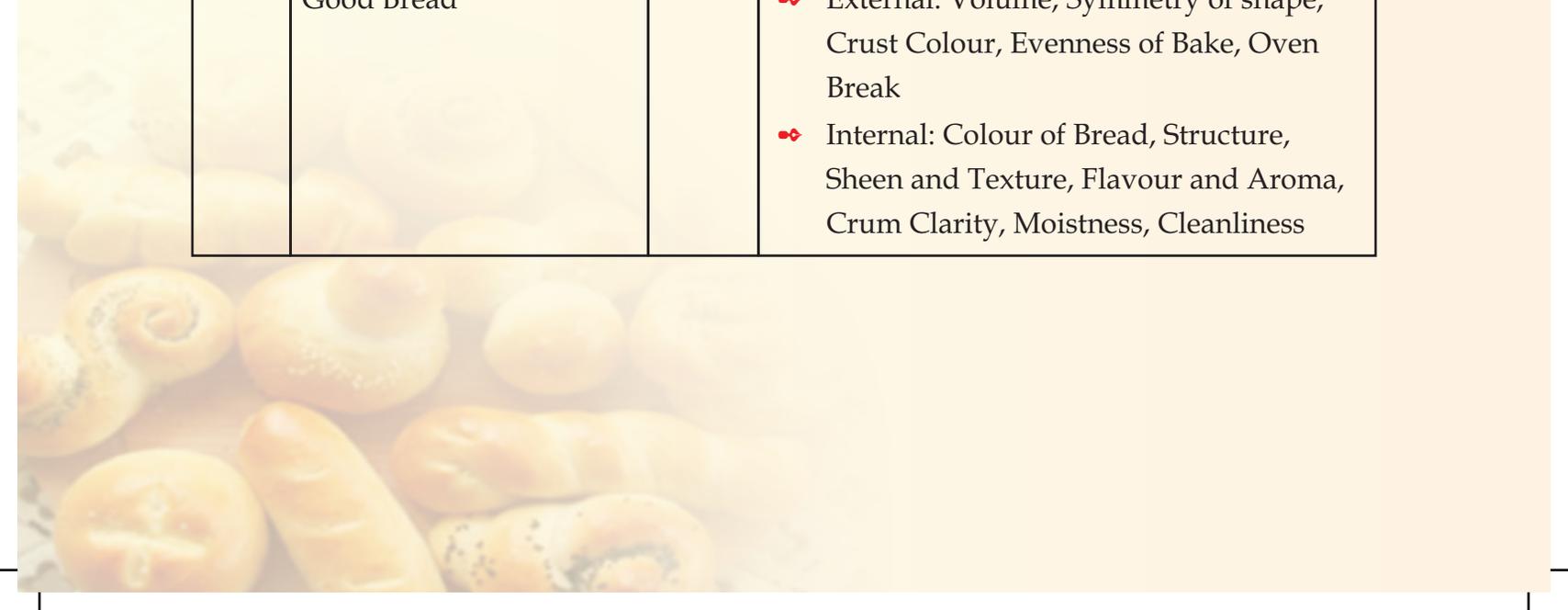


# Module Objectives Bakery & Confectionery

S.No.	Unit/Chapter Name	Theory	Key Learning Objectives
1.	Introduction to Bakery & Confectionery	18 hrs	<ul style="list-style-type: none"> <li>❖ General Overview</li> <li>❖ Scope of Bakery</li> <li>❖ Learning the Organizational Structure</li> <li>❖ Units of Measurement</li> <li>❖ Bakery &amp; Confectionery Terms</li> <li>❖ Basic Equipment for Bakery</li> <li>❖ Baking Temperature for Bakery Products</li> </ul>
2.	Hygiene	14 hrs	<ul style="list-style-type: none"> <li>❖ General Overview</li> <li>❖ Concept of Hygiene and its importance in Bakery</li> <li>❖ Personal Hygiene</li> <li>❖ Work Area Hygiene</li> <li>❖ Basic First Aid</li> </ul>
3.	Structure of Wheat Grain	12 hrs	<ul style="list-style-type: none"> <li>❖ General Overview</li> <li>❖ Physical Structure</li> <li>❖ Longitudinal Section</li> </ul>
4.	Milling of Wheat	14 hrs	<ul style="list-style-type: none"> <li>❖ General Overview</li> </ul>



			<ul style="list-style-type: none"> <li>❖ Wheat Milling Process</li> <li>❖ Roller four Mills, Stone Mills</li> </ul>
5.	Flour	18 hrs	<ul style="list-style-type: none"> <li>❖ General Overview</li> <li>❖ Composition of Wheat Flour</li> <li>❖ Types of Flour</li> <li>❖ Grades of Wheat Flour</li> <li>❖ Water Absorption Power</li> <li>❖ Gluten</li> </ul>
6.	Role of Raw Materials used for Bread Making	20 hrs	<ul style="list-style-type: none"> <li>❖ General Overview</li> <li>❖ Essential: Flour, Salt, Yeast, Water, Sugar</li> <li>❖ Optional: Fats &amp; Oils, Eggs, Bread Improvers, Milk</li> </ul>
7.	Methods of Bread Making	10 hrs	<ul style="list-style-type: none"> <li>❖ General Overview</li> <li>❖ Straight Dough Method</li> <li>❖ Sponge and Dough Method</li> </ul>
8.	Characteristics of a Good Bread	14 hrs	<ul style="list-style-type: none"> <li>❖ General Overview</li> <li>❖ External: Volume, Symmetry of shape, Crust Colour, Evenness of Bake, Oven Break</li> <li>❖ Internal: Colour of Bread, Structure, Sheen and Texture, Flavour and Aroma, Crum Clarity, Moistness, Cleanliness</li> </ul>





# Chapter-1

## Introduction to Bakery & Confectionery

### 1.0 Unit Overview & Description

- Overview
- Knowledge and skill outcomes
- Resource Materials
- Duration
- Learning outcomes
- Assessment Plan

- 1.1 Introduction to Bakery & Confectionery
- 1.2 Scope of Bakery
- 1.3 Organizational Structure
- 1.4 Units of Measurements
- 1.5 Bakery & Confectionery Terms
- 1.6 Basic Equipments
- 1.7 Baking Temperatures for Bakery Products

### 1.0 UNIT OVERVIEW & DESCRIPTION

#### Overview:

This unit will provide the student information about the scope of bakery & the organizational structure of bakery. It will help to understand the units of measurements, terms, equipments and temperatures for bakery products.

#### Knowledge and skill outcomes:

- i) Understand the scope of bakery.
- ii) Know the organizational structure of bakery.
- iii) Know the units of measurements, bakery terms, equipments and baking temperatures.

## Resource Materials

- ❖ Matz, S. *Equipment for bakers*. McAllen, TX: Pan-Tech International, c1988.
- ❖ Gisslin, W. *Professional baking*. New York : John Wiley & Sons, c1985.
- ❖ Sultan, W. J. *Practical baking*. 5th edition. New York : Van Nostrand Reinhold, c1990
- ❖ Pylar, E. *Baking science and technology*. 3rd edition. Merriam, KS: Sosland Publishing Co., c1988.
- ❖ Schunemann, C. & Treu, G. *Baking: the art and the science*. Calgary, Alberta, Canada: Baker Tech, Inc., c1988.

**Duration:** Total Hours 18

## Learning Outcomes:

1.1 Introduction to Bakery & Confectionery	General Overview
1.2 Scope of Bakery	<ul style="list-style-type: none"><li>❖ To get familiarized with the scope of bakery</li><li>❖ To know the importance of bakery</li></ul>
1.3 Organizational Structure	<ul style="list-style-type: none"><li>❖ List down all the organizational levels</li><li>❖ Understand the roles of the personnel</li></ul>
1.4 Units of Measurement	<ul style="list-style-type: none"><li>❖ List down the units of measurements used in bakery</li><li>❖ Learn the conversions of the units</li></ul>
1.5 Bakery & Confectionery Terms	<ul style="list-style-type: none"><li>❖ List down all the terms used in bakery</li><li>❖ Understand the meaning of the terms</li></ul>
1.6 Basic Equipments	<ul style="list-style-type: none"><li>❖ List down all the equipments used in bakery</li><li>❖ Differentiate between heavy &amp; light equipments</li></ul>
1.7 Baking Temperatures for Bakery Products	<ul style="list-style-type: none"><li>❖ Familiarize with the temperatures for bakery products</li><li>❖ Know the different temperatures</li></ul>



### Assessment Plan: (For the Teachers)

Unit-1	Topic	Assessment Method	Time Plan	Remarks
1.2	Scope of Bakery	Exercise: Question & Answer		
1.3	Organizational Structure	Exercise: Question & Answer		
1.4	Units of Measurements	Exercise: Question & Answer		
1.5	Bakery & Confectionery Terms	Exercise: Question & Answer Group Discussion		
1.6	Basic Equipments	Exercise: Question & Answer		
1.7	Baking Temperatures for Bakery Products	Exercise: Question & Answer		

## 1.1 INTRODUCTION TO BAKERY & CONFECTIONERY

### Definition:

Baking is the cooking of food by dry heat in an oven in which the action of the dry convection heat is modified by steam. The dry heat of baking changes the form of starches in the food and causes its outer surfaces to brown, giving it an attractive appearance and taste. The browning is caused by caramelization of sugars. When baking, consideration must be given to the amount of fat that is contained in the food item. Higher levels of fat such as margarine, butter or vegetable shortening will cause an item to spread out during the baking process. A bakery (or baker's shop) is an establishment which produces and sells flour-based food baked in an oven such as bread, cakes, pastries and pies.

### Methods:

Three methods of baking can be identified.

- ❖ **Dry Baking:** when baking, steam rises from the water content of the food; this steam combines with the dry heat of the oven to cook the food, e.g. cakes, pastry, baked jacket potatoes.

- 
- ❖ **Increased Humidity Baking:** when baking certain foods, e.g. bread, the oven humidity is increased by placing a bowl of water or injection steam into the oven, thus increasing the water content of the food and so improving the eating quality.
  - ❖ **Bain Marie:** when baking, place food in a container of water (bain marie) which modifies the heat so that the food cooks more slowly, does not overheat or overcook.

#### Advantages:

- ❖ A wide range of savory and sweet foods can be produced
- ❖ Bakery products yield appetizing goods with eye-appeal and mouth-watering aromas
- ❖ Bulk cooking can be achieved with uniformity of color and degree of cooking
- ❖ Baking ovens have effective manual or automatic controls
- ❖ There is straightforward access for loading and removal of items

#### Disadvantages:

- ❖ Requires regular attention
- ❖ Ovens are expensive to heat

#### Aims and Objectives of Bakery are as follows:

1. Establish and maintain high standards of sanitation
2. Exhibit a strong foundation of baking methodology
3. Exhibit nutritional awareness and implement food-for-life principles
4. Plan production of product and purchase, cost, and price product for profit
5. Exhibit a solid foundation of techniques for food preparation, presentation, and service, including competence in baking and pastry production, line work, and basic garde manger
6. Use problem solving techniques in maintaining kitchen morale and building a team spirit



7. Communicate clearly, both verbally and in writing
8. Conform to professional standards in appearance, attitude, and performance
9. Conform to established codes of ethics
10. Demonstrate display techniques as they apply to hot and cold dessert presentations
11. Demonstrate basic knowledge and skills for display pieces including chocolate, marzipan, pulled sugar, and nougat
12. Plan and present a grand pastry buffet
13. Demonstrate working knowledge of the factors involved in setting up and operating a baking and pastry facility
14. Demonstrate the ability to keep accurate food business records and understand the relationship between financial profits and good business ethics
15. Demonstrate creativity and sound thinking in solving management problems in merchandising techniques
16. Demonstrate a commitment to the profession through activities such as attending meetings, seminars, continuing education programs, and professional association memberships
17. Develop skills for problem solving, decision making, and critical thinking

#### **Qualities of a Baker:**

Being a baker is a lot more than just knowing how to bake bread. Bakery and confectionery as a career is both an art and science. A baker makes various kinds of loaves, bread rolls, croissants, buns, pastries, cakes and savories by adding his own innovation to his basic knowledge of baking. Every course on baking and confectionery teaches how to weigh out and measure ingredients, mix, divide and mould dough, set the dough to rise, bake different bread and confectionery products and how to decorate, slice and wrap the final product.

'Proper knowledge of ingredients, costing, proper methods of preparing products and



pricing is essential. One should at least know that mozzarella and not Amul Cheese should be used to make pizza. One should also take care not to waste ingredients. A good baker & confectioner should be well-acquainted with the products that he/she is using, the reaction when he/she mixes products and correct presentation.'

A hotel management course will just give the student the basics. To be an excellent confectioner one needs develop new recipes regularly. If you are catering to Indian confectionery items you need to learn the ropes from a mithai wallah. You must get fresh cow milk to make sweat-meats. You should not store mithai for a long time ' long-term refrigeration will just spoil it ' if at all storage is necessary sweet-meat should be stored in syrup.'

## 1.2 SCOPE OF BAKERY

Bakery industry in India today has an important place in the industrial map of the country. Bakery products are an item of mass consumption in view of its low price and high nutrient value. With rapid growth and changing eating habits of people, bakery products have gained popularity among masses. The sector, typically, constitutes cakes, breads and biscuits.

Bakery industry in India is on a growth curve. The sector which is difficult to define has indicated promising growth prospects and has been making rapid progress. The bakery industry has achieved third position in generating revenue among the processed food sector. The first and second segments are the wheat flour processing and fruits and vegetables processing, stated experts from the food industry.

The bakery industry also is a lucrative sector for entrepreneurship in the food industry. This calls for honing skills in baking science and technology.

With Globalization and India being viewed as a potential growth market, there has been a profusion of bakery chains springing up across the country. These include Au Bon Pain, the US-based bakery cafe chain, Monginis, Donut Baker, Cookie Man, Croissant, Cafe Coffee Day, Oven pick, Bread Talk, SAJ Industries Bisk Farm, Hot Bread, Birdy's, Donut Master and Cookie Jar.

“For a bakery and cafe chains there are several challenges to meet when it comes to



growth of the business and generating revenue. Some of the issues are procuring highest quality of ingredients, maintaining consistency in standards of food and managing efficient service in terms of hospitality.

#### Tips on opening your own Bakery / Confectionery Outlet

The main factors driving bakery industry are diverse. This is because the structure of the bakery industry comprises three segments namely need-based, basic hotel requirements and connoisseur requisites. The need-based category caters to products like bread and biscuits. Under hotels, it varies from breads to pastries, cakes, pizza and puffs. The connoisseur category focusses on international standard and will cover products like specialized pastries and cakes.

'Firstly, they should find out what the tastes of the native people are and price the items in accordance to the budget of the people. The bakery unit should be located at a place in the city, which attracts customers. The initial infrastructure may be of low budget and with small space. All is needed in a specialized oven, a marble top table, a mixie and a refrigerator in a small room. If a confectionery has to be set up an air conditioned room is mandatory. 'The products you make depends on the clientele, climate of the place and what ingredients are easily available. If you open a bakery in a warm country like India you can work with tropical fruits as they are easily available. A good baker should be able to adjust easily. Cream, butter and other ingredients may vary from country to country-recipes should be adjusted accordingly.

A good baker should be able to experiment with flavors.

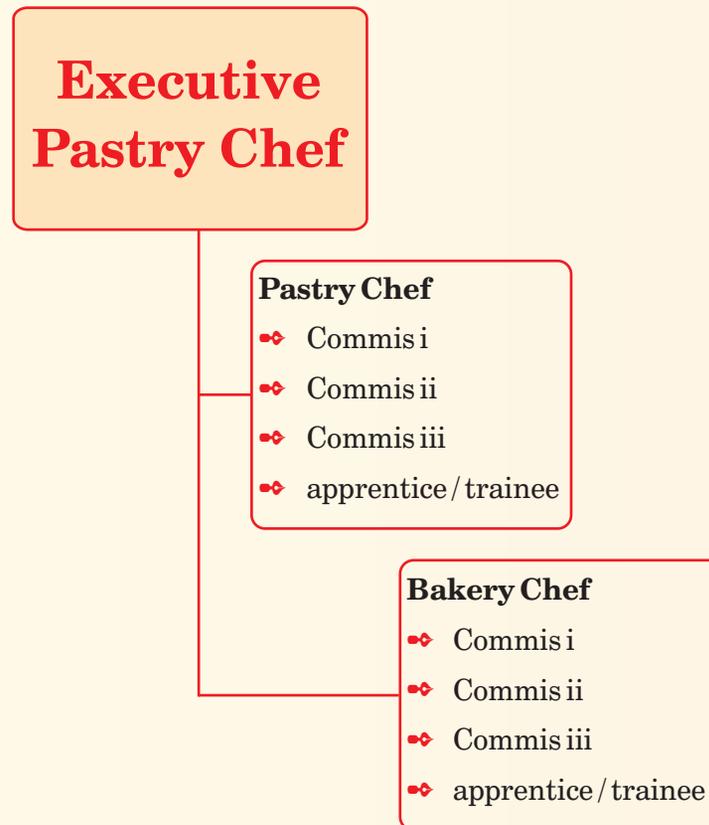
#### Exercise

#### Activity:-

- Q1) Define Baking?
- Q2) What are the qualities a good baker should have?
- Q3) How a bakery can be different from a Confectionery?
- Q4) Write five objectives of Baking?

### 1.3 ORGANIZATIONAL STRUCTURE

#### Organizational Chart of a Medium-Size Hotel



#### Exercise

#### Activity:-

- Draw the organizational chart of a bakery of a medium hotel?

### 1.4 UNITS OF MEASUREMENTS

Measuring accurately is probably the most important cooking skill in the kitchen. Home Economists in test kitchens spend many hours testing recipes with varying measurements in a process called 'tolerance testing'. A recipe must perform well even though the ingredient amounts are changed; if the recipe fails tolerance testing, it is not published. Even though the recipes in cook books are quite 'tolerant', the cook still has to follow basic rules of measuring.



Proper measuring is critical to baking. Baking is a science, and when you mix together ingredients, you're creating chemistry, albeit edible chemistry, so being precise is important. There is balance between flour, leaveners, fats, and liquids.

Extra salt or baking soda can ruin otherwise perfect cookies. Too much flour makes muffins taste dry and flavorless. No beginning cook should be nonchalant about measuring. The success of your recipe depends on it.

As you begin to feel more comfortable with baking, you may feel inclined to experiment a bit, maybe add some chocolate chips to peanut butter cookies, or throw some nuts or dried cranberries into oatmeal cookies, or substitute pecans for walnuts. That's all well and fine, but give it time. You're never too good or experienced to measure.

### Measuring Equipment

Using all the measurement and baking tools designed for baking and cooking can be overwhelming and challenging. However, understanding the proper use of baking equipment will lead to quicker and easier baking and better tasting and looking results. Baking and measuring tools such as measuring cups, different mixing mechanisms and cooking instruments will help ensure you follow recipes accurately and create the baked goods that you set out to make

**Measuring Spoons** come in sets of four or six, ranging from 1/4 teaspoon to 1 tablespoon. (Be sure to use graded teaspoons and tablespoons – and not the spoons you use to eat with—for accuracy.) You can use the same measuring tools for both liquids and dry ingredients. For liquids, fill the spoon until it's full. For dry ingredients, pour or scoop into the spoon until it's full, leveling off the spoon with the straight edge of a spatula or knife.

Never measure over the bowl of ingredients you're using for the recipe. If you over pour or level extra into the bowl, your measurements will not be accurate.

**Measuring Cups** are essential for every kitchen. You won't find many recipes that don't require measurements of some kind. Measuring cups come in two basic types:

- ❖ **Graded:** Graded cups range in sizes from 1/4 cup to 1 cup and can range from 4 to 6 cups in a set. Use graded cups to measure dry ingredients and solid fats, such as shortening.



❖ **Glass:** Glass cups are available in a wide range of sizes, the most common being 1 cup, 2 cups, and 4 cups. Use these cups for measuring liquids.

❖ When measuring thick, sticky liquids such as honey, molasses, and corn syrup, spray the inside of the measuring glass with nonstick cooking spray or grease it a little with oil. The liquid will then be much easier to remove. Here's a basic guide to measuring common ingredients.

❖ **Flour**

Stir flour in the storage container or bag. Using a large spoon, lightly spoon flour from the container into the measuring cup. Do not shake the cup and do not pack the flour. Using the back of a knife or flat blade spatula, level off the flour even with the top edge of the measuring cup. Don't use the measuring cup to scoop the flour out of the container. You can end up with 150% of the correct measurement if you do this! One cup of correctly measured flour should weigh about 120 to 125 grams.

❖ **Baking powder and Baking Soda**

Stir in the container. Using the measuring spoon, lightly scoop out of the container. Use that knife to level off even with the top edge of the measuring spoon.

❖ **Sugar**

Sugar is measured by scooping the cup or measuring spoon into the container or bag until it is overflowing, then leveling off with the back of a knife.

❖ **Brown Sugar**

This needs to be packed into the measuring cup. The sugar should retain the shape of the cup when it is dropped into the other ingredients.

❖ **Powdered Sugar**

Powdered sugar usually needs to be sifted to remove small lumps. It is measured by spooning the sugar into the measuring cup from the container, then leveling off with the back of a knife.

❖ **Liquid Ingredients**

Liquids need to be measured at eye level. Using the liquid measuring cup, pour the



liquid into the cup. Then bend over so you are on the same level with the measuring marks. The liquid should be right at the mark, not above or below.

#### ❖ **Semi-Liquid Ingredients**

Ingredients like sour cream, peanut butter, and yogurt are measured using dry measuring cups because they are too thick to be accurately measured in the liquid cups. Level off sour cream and peanut butter with the back of a knife.

#### ❖ **Shortening and Solid Fats**

Butter and margarine have measuring amounts marked on the sides of the paper wrapping. One quarter pound stick of butter or margarine equals 1/2 cup. Solid shortening is measured by packing it into a cup so there are no air spaces, then leveling off with the knife. To easily remove fats from baking cups, spray them with a nonstick cooking spray before measuring. You can also use the liquid displacement method for measuring solid fats. For instance, if you want 1/2 cup of shortening, fill a liquid measuring cup with 1/2 cup of cold water. Then add shortening until the water level reaches 1 cup when you look at it at eye level. Pour out the water and use the shortening. Oil is measured as a liquid.

#### ❖ **Liquid Ingredients in Spoons**

Make sure that you don't measure small amounts of liquid ingredients over the mixing bowl. It's just too easy to spill, and you don't want 2 teaspoons of almond extract when the recipe only calls for 1 teaspoon!

#### ❖ **Dry Ingredients in Spoons**

Ingredients measured in these small amounts still have to be measured carefully. Overfill the measuring spoons and level off using the back of a knife for the most accurate amounts. Accurate amounts of ingredients like baking soda and powder are critical to the success of any baked product.

#### ❖ **Chopped Ingredients**

Pay close attention to whether or not an ingredient is to be chopped, diced or minced, and whether they are measured before chopping or after. Then the foods are placed in the measuring cup so the top is level with the surface.



Dry Ingredient Equivalents		
1 tablespoon	3 teaspoons	15 ml
1/8 cup	2 tablespoons	30 ml
1/4 cup	4 tablespoons	50 ml
1/3 cup	5-1/3 tablespoons	75 ml
1/2 cup	8 tablespoons	125 ml
2/3 cup	10-2/3 tablespoons	150 ml
3/4 cup	12 tablespoons	175 ml
1 cup	16 tablespoons	250 ml
Wet Ingredient Equivalents		
1 cup	8 fluid ounces	1/2 pint
2 cups	16 fluid ounces	1 pint
4 cups	32 fluid ounces	2 pints
8 cups	64 fluid ounces	4 pints

If a Recipe Calls for This Amount	You Also Can Measure It This Way
Dash	2 or 3 drops (liquid) or less than 1/8 teaspoon (dry)
1 tablespoon	3 teaspoons or 1/2 ounce
2 tablespoons	1 ounce
1/4 cup	4 tablespoons or 2 ounces
1/3 cup	5 tablespoons plus 1 teaspoon
1/2 cup	8 tablespoons or 4 ounces
1 cup	16 tablespoons or 8 ounces
1 pint	2 cups or 16 ounces or 1 pound
1 quart	4 cups or 2 pints
1 gallon	4 quarts
1 pound	16 ounces





## Exercise

### Activity:-

Q1) Write units of measuring weight?

Q2) List few equipments used in measuring liquids.

❖ 1 pound = \_\_\_\_\_ ounces

❖ 1 cup = \_\_\_\_\_ pint

## 1.5 BAKERY & CONFECTIONERY TERMS

**Aeration:** The treatment of dough or batter by charging with gas to produce a volume increase.

**Absorption:** Taking in or reception by molecular and or physical action. Property of wheat flour that enables it to absorb liquid.

**Albumen:** Egg white.

**Almond Paste:** Almonds ground to paste with sugar.

**Ash:** The incombustible residue left after burning matter. The term is used to denote the level of bran present in Maida.

**Bacteria:** Microscopic organisms, various species of which are involved in fermentation and spoilage of food.

**Bake:** To cook or roast by dry heat in a closed chamber such as an oven.

**Baking Powder:** A chemical leavening agent composed of soda, dry acids, and corn starch (to absorb moisture), when heated, carbon dioxide is given off, to raise the batter during baking.

**Batter:** A homogenous mixture of ingredients with liquid to make a mass that has soft plastic character.

**Bay:** A well, made in a heap of flour and other dry materials to receive the liquid ingredients for mixing.

**Bleached Flour:** The term refers to flour that has been treated by a chemical to remove its natural colour and make it whiter.



**Bleeding:** Term applied to dough that has been cut and left unsealed at the cut thus permitting the escape of leavening gas.

**Blend:** A mixture of several ingredients or grades of any ingredient.

**Bolting:** Sifting of ground grain to remove the bran and coarse particles.

**Bran:** A skin or outer covering of wheat grain.

**Bread:** The accepted term for baked foods made of flour, sugar, shortening, salt and liquid, and leavened by the action of yeast.

**Buns:** Small shapes of bread dough, sometimes slightly sweetened or flavored.

**Bread Dough:** The unbaked mass of ingredients used for making bread.

**Butter Cream:** Rich, uncooked frosting containing powder sugar, butter and / or other shortening and whipped to plastic condition.

**Butter Sponge:** Cake made from sponge cake batter to which shortening has been added.

**Butterscotch:** A flavor produced by the use of butter and brown sugar.

**Cake:** A product obtained by baking a leavened batter containing flour, sugar, salt, egg, milk, liquid, flavoring, shortening, and a leavening agent.

**Caramelized Sugar:** Dry sugar heated with constant stirring until melted and dark in colour.

**Carbohydrates:** Sugar and starches derived chiefly from fruits and vegetables sources, which contain set amounts of carbon, hydrogen and oxygen.

**Cardamom:** Seed of a spice plant used for flavoring.

**Casien:** Principal nitrogenous or protein part of milk.

**Clear Flour:** Lower grade and higher ash content flour remaining after the patent flour has been separated.

**Cinnamon:** The aromatic bark of certain trees of the laurel family, ground and used as spice flavoring.

**Citron:** The sweetened rind of fruit.

**Corn Meal:** A coarse meal made by grounding corn.



**Cottage Cheese:** The drained curd of soured or coagulated cream pressed and mixed until smooth.

**Cream:** The fat portion of milk; also a thickened cooked mass of sugar, egg, milk, and a thicker used for pies and other fillings.

**Creaming:** The process of mixing and aerating, shortening and another solid such as sugar and flour.

**Crescent Rolls:** Hard crusted rolls shaped into crescents, often with seeds on top.

**Cripple:** A misshapen, burnet or otherwise undesirable unit.

**Crusting:** Formation of dry crust on surface which occurs from evaporation of water from the surface.

**Custard:** A sweetened mixture of eggs and milk, which is baked or cooked over hot water.

**Danish Pastry:** A flaky yeast dough having butter or shortening rolled in to it.

**Daistase:** An enzyme possessing the power to convert starches in to dextrin and maltose.

**Divider:** A machine used for cutting dough into desired size or weight. The dough is cut by volume not by weight.

**Docking:** Punching a number of vertical impressions in dough piece prior to baking. Docking is done so that dough expands uniformly without bulging during baking.

**Dough:** The mixed mass of combined ingredients for bread/rolls and biscuits, and other baked products.

**Dough Conditioner:** A chemical product added to improve flour in its properties to hold gas.

**Dough Room:** Special rooms in which bread doughs are mixed.

**Dough Temperatures:** Temperature of dough at different stage of processing.

**Doughnuts:** A cake frequently with a center hole, made of yeast-raised or baking powder dough, and fried in deep fat.

**Dry Yeast:** A dehydrated form of yeast. Dry yeast has a long shelf life against fresh yeast, which is perishable.



**Dusting:** Spreading a thin film of flour or starch on pans, workbench surfaces or machine surfaces that handle dough pieces.

**Dusting Flour:** Flour used to shift on to dough handling equipment to prevent dough from sticking.

**Eclair:** A long thin shell of the same paste as cream puffs.

**Emulsification:** The process of blending together fat and water solutions of ingredients to produce a stable mixture, which will not separate on standing.

**Enriched Bread:** Bread made from enriched flour and containing prescribed amounts of vitamins and minerals.

**Enzyme:** A substance produced by living organisms that has the power to bring about changes in organic materials.

**Evaporated Milk:** Unsweetened thickened milk from which water has been removed

**Fermentation:** The chemical changes in an organic compound due to action of living organisms (yeast or bacteria), usually producing a leavening gas.

**Flour Extraction:** A term referring to the proportion of the wheat that becomes flour. Commercial flour in the United States is the 72 percent extraction.

**Foam:** Mass of beaten egg and sugar as in a sponge cake before the flour is added.

**Fold:** To fold yeasted dough sheet over on to itself. With cake batter to lift and lap the batter on to itself to lightly incorporate ingredients.

**Fondant:** Low moisture content sugar syrup containing, a small quantity of invert syrup that has been rapidly cooled so that the sugar crystals are small in size.

**French Bread:** An unsweetened crusty bread, baked in a narrow strip and containing little or no shortening.

**Fruit Cake:** A cake containing large amounts of fruits and nuts with only enough cake batter to bind them together.

**Germ:** The part of seed from which new plant grows.

**Glace:** Sugar so treated as to resemble ice.

**Gliadin:** One of the two proteins comprising gluten which provides elasticity



**Glucose:** A simple sugar made by action of acid or starch.

**Gluten:** The elastic process mass that is formed when the protein material of the wheat flour is mixed with water.

**Glutenin:** One of the two proteins comprising gluten, which gives strength.

**Graham Flour:** Finely ground whole wheat flour.

**Graining:** After boiling a sugar solution to the desired temperature, the solution will crystallize upon cooling. If cooling is slow, large crystals will form. Rapid cooling produces small crystals as well rapid mixing during cooling. Small fine crystals are desired in making fondant which is prepared with the process of cooling and mixing. The process is called graining.

**Greasing:** Spreading a film of fat in a surface.

**Hearth:** The heated baking surface of the floor of an oven.

**Humidity:** Usually expressed as “Relative humidity” which is an expression of percent of moisture in air related to the total moisture capacity of that air at a particular temperature.

**Hydrogenated Oil:** Oil that has been treated with hydrogen to convert it to a hardened form.

**Ice:** To frost or put on an icing or frosting.

**Ingredients:** Food material blended to give palatable products.

**Invert Sugar:** A mixture of dextrose and levulose made by inverting sucrose with acid or enzyme.

**Lactose:** The sugar of the milk.

**Lard:** Rendered hog fat.

**Leavening:** Raising or lightening by air, steam or gas (carbon dioxide). The agent for generating gas in a dough or batter is usually yeast or baking powder.

**Levulose:** A simple sugar found in honey and fruits.

**Loaf-Cake:** Cake baked in bread pans or similar deep containers.

**Macaroons:** Small biscuits made from coconut or almond paste, sugar and egg whites.



**Make-up:** Manual or mechanical manipulation of dough to provide desired size and shape.

**Malt Extract:** A syrupy liquid obtained from malt mesh, a product obtained as a result of converting the starch of sugar.

**Marshmallow:** A white confection of meringue like consistency.

**Marzipan:** Almond paste used for modeling, masking and decoration.

**Masking:** Act of covering with icing or frosting.

**Melting Point:** The temperature at which a solid becomes liquid.

**Meringue:** A white frothy mass of beaten egg white and sugar.

**Middlings:** Granular particles of the endosperm of wheat made during grinding of grains in the mills.

**Mocha:** A flavour combination of coffee and chocolate, but predominantly that of coffee.

**Moisture:** Water content of a substance.

**Molasses:** Light to dark brown syrup obtained in making cane sugar.

**Moulder:** Machine that shapes dough pieces for various shapes.

**Old Doughs:** Yeasted doughs that have become over fermented. This produces finished baked loaf dark in crumb colour, sour in flavour, low in volume, coarse in grain and tough in texture.

**Patent Flour:** The clean flour made by grinding the choice portion of the inner portion of the wheat.

**Pie:** Dessert with pastry bottom, fruit or cream filling and topped with meringue, whipped cream or pastry.

**Plasticity:** The consistency of feel of shortening.

**Proof Box:** Closed box or cabinet in which pans with molded and made up dough pieces are kept for final stage of fermentation. It should have provisions for controlled temperature and humidity.

**Puff Pastry:** A pastry dough inter layered with butter or shortening to give flakiness. Leavened during baking by the internally generated steam.



**Rolling Pin:** Smooth surfaced wood pieces for rolling dough.

**Quick Breads:** Bread product baked from lean chemically leavened batter.

**Rolls:** Small breads made from yeast leavened dough sometimes called buns, may be hard or soft crusted.

**Rope:** A spoiling bacterial growth in bread experienced when the dough becomes infected with bacterial spores. Poor sanitation can result rope in bread.

**Royal Icing:** Decorative frosting of cooked sugar and egg white.

**Scoring:** Judging finished goods according to points of perfection, or to cut or slash the top surface of dough pieces.

**Shortening:** Fat or oil used to tenderize baked goods or to fry products.

**Sifting:** Pass through fine mesh for effective blending and to remove foreign or over size particles.

**Snaps:** Small biscuits that run flat during baking and become crisp on cooling.

**Solidifying Point:** Temperature at which liquid changes to a solid state.

**Slack Dough:** Dough that is soft and extensible, but has lost its elasticity.

**Stabilizers:** Commercial preparations for use in meringue, pie fillings, icing and marshmallows.

**Starch Water:** A mixture of corn starch and water made by boiling together one or two tablespoons of corn starch and about a liter of water. This is used for brushing on bread to give a shine to the crust.

**Steam:** Vapor formed and given off from heated water.

**Straight Flour:** Flour containing the entire wheat berry excluding the bran and feed.

**Strong Flour:** One that is suitable for the production of bread of good volume and quality.

**Corn Sugar-Dextrose:** A form of sugar made from corn and readily fermentable.

**Sugarcane or Beet-Sucrose:** Common and usually granulated sweetening agent

**Tart:** Small pastries with heavy fruit filling or cream.



**Tempering:** Adjusting temperature of ingredients to a certain degree.

**Texture:** Describes the measure of silkiness of the interior structure of a baked product as sensed by the touch of the cut surface.

**Troughs:** Large containers usually on wheels used for holding large masses of rising (fermenting) doughs.

**Vegetable Colour:** Liquid or pastes of vegetable nature used for colouring.

**Vienna Colour:** A hearth type bread with heavy crisp crust, sometimes finished with seed toppings.

**Wash:** A liquid brush on the surface of an unbaked product. May be water, milk, starch solution, thin syrup of egg.

**Water Absorption:** water required for obtaining bread dough of desired consistency. Flours vary in ability to absorb water. This depends on the age of flour, moisture content, wheat from which it is milled, storage conditions and milling process.

**Whip:** A hand or mechanical beater of wire construction used to whip materials such as cream or egg whites to a frothy consistency.

**Yeast:** A microscopic plant that reproduces by budding and causes fermentation and the giving off carbon dioxide.

**Young doughs:** Yeast dough that is under-fermented. This produces finished yeast goods, which are light in colour, tight in grain and low in volume.

**Zweibach:** A toast made of bread or plain coffee cake dried in slow oven.

### Exercise

#### Activity:-

Q1) Define the following?

- a) Aeration
- b) Docking
- c) Bleeding
- d) Whip
- e) Emulsification



## 1.6 BASIC EQUIPMENTS

### LIGHT EQUIPMENTS:

#### Cookie, Cake and Bread Pans:

The most fundamental components of a baker's kitchen are good quality baking sheets and baking pans. Invest in good-quality commercial-type pans which are heavier and retain heat better than lighter pans, and won't warp or buckle. Most cookie, bread, and cake pans are made from light-coloured aluminum, providing quick steady heat to allow the ingredients to rise evenly and produce tender, delicate crusts.

#### Cookie and Baking Sheets:



Cookie sheets are rimless, flat metal sheets, perfectly designed for placing rows of cookies. They normally have a small rim on the short sides for easy gripping. The long flat edges allow you to slide cookies off the sheet after baking. [Shop here for cookie sheets.](#)

Baking sheets have raised edges all around, and are normally the choice for professional bakers. They are a good, all-purpose pan and can be used for everything from baking cookies to toasting nuts. [Shop here for baking sheets.](#)



You normally want to have a set of 2 cookie sheets or 2 baking sheets, or both. When baking cookies, the second sheet can be waiting to go into the oven while the first one is baking.

If you're buying new, invest in good quality, heavy duty cookie and baking sheets. Heavy duty baking sheets retain heat better, won't warp or buckle when heated, and should last a lifetime.

Choose cookie and baking sheets made of shiny, light colored metals, such as heavy-duty aluminum. The light color encourages even baking and are less likely to burn. Dark metals sheets and nonstick tend to brown baked goods faster; you may need to lower the oven temperature by 25 degrees and reduce the baking time slightly.



Insulated pans have a layer of air trapped between the layers of metal, which help prevent cookies from burning. However, since these pans are poor heat conductors, cookies may not tend to bake and brown as well, and you may over bake the cookies waiting for them to brown.

### **Jelly Roll Pans:**

Jelly Roll pans are the same as a baking sheet. They have a raised edge all around, usually  $\frac{1}{2}$  to 1 inch high. The most all-purpose size to have is a  $12\frac{1}{2} \times 17\frac{1}{2}$  by 1 inch Jelly Roll Pan. Jelly roll pans are most often used to make bar cookies, shortbread, sponge cakes, sheet cakes, focaccia breads, and more. A jelly roll pan is also good to place under a fruit pie as it is baking to catch overflowing juices, and to hold spring form and tart pans with removable bottoms while baking.



### **Layer Cake Pans:**

Many basic cake recipes use traditional round layer cake pans that are either 8 or 9 inches in diameter. The pans should be at least 2 or  $2\frac{1}{2}$  inches deep so that the batter doesn't overflow. You'll want to have a set of at least two round layer cake pans, however a set of three pans is best as many cake recipes are made with 3 layers. Choose pans with no seams on the inside and a good, heavy feel to them.



### **Loaf Pans:**

Loaf pans are used for most quick bread recipes, such as banana bread and zucchini bread. Metal, stone, glass, and ceramic loaf pans all work well for quick breads. Loaf pans can also be used for yeast breads. The most useful sizes are a  $9\frac{1}{4} \times 5\frac{1}{4} \times 2\frac{1}{2}$  inch loaf pans for larger loaves and  $8\frac{1}{2} \times 4\frac{1}{2} \times 2\frac{1}{2}$  inch loaf pans for smaller loaves. Darker loaf pans are good for crusty yeast breads, however light aluminum is best for sweet and quick breads so they don't over-darken.





### **Muffin Pans and Baking Cups:**

Muffin pans are a rectangular metal baking pan with six or twelve cup, used to bake both muffins and cupcakes. Muffin pan sizes are typically mini, standard, and jumbo sized. Each cup is normally lined with paper baking cups, and then filled with muffin or cake batter. Muffin pans can also be used to bake dinner rolls or individual brownies.



A standard muffin pan has 12 cups, each measuring about  $2\frac{3}{4}$  inches at the top and  $1\text{-}3/8$  inches deep. Mini muffin pans normally have either 12 or 24 cups and measure about  $1\frac{3}{4}$  inch across the top and  $\frac{3}{4}$  inch deep. Jumbo muffin pans normally have 6 cups, and measure  $3\text{-}3/8$  inches across the top and  $1\frac{3}{4}$  inches deep.



Muffin pans are traditionally made of metal; most common are aluminum pans; however flexible silicone pans are now available.

Baking cups are paper or foil cups used to line muffin or cupcake pans. The baking cups hold the batter making it easy to release the baked cakes from the pan. Baking cups are also available in reusable silicone. Paper cups come in a variety of fun and seasonal designs and colors.

### **Sheet Cake Pans:**

A single layer sheet cake is most often baked in a  $13 \times 9 \times 2$  inch Rectangular Pan, replacing a typical two-layer cake. The pan should be at least 2 inches deep, and for ease in cleaning, look for pans that have slightly rounded inside corners. Square corners can trap crumbs in the crevices.



### **Spring Form Pans:**

Spring form pans are used for cheesecakes, streusel-topped cake, delicate tortes, and other cakes that would be damaged by turning them upside down to remove them from the pan. Spring form pans are normally round, with expandable sides that are secured with a clamp and have a removable bottom. When the

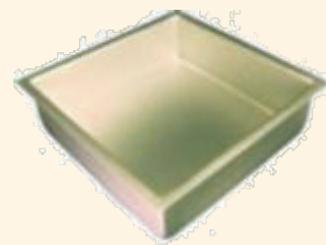




clamp is opened, the sides of the pan expand and release the bottom. When purchasing a spring form pan, examine how tightly the side locks onto the pan bottom when clamped into position. Less expensive spring form pans may be prone to leaking and will bend or warp easily.

### **Square Baking Pans:**

Many bar cookie and brownie recipes, and some small cakes, use a square baking pan that is either 8 or 9 inches. The pans should be at least 2 or 2½ inches deep so that the batter doesn't overflow. Choose pans with no seams on the inside and a good, heavy feel to them. Aluminum pans are the best for cookies and brownies, and a glass pan is best for fruit desserts, baked custards, and bread puddings.



### **Tube Pans:**

The tube is used to conduct heat through the center of a cake, ensuring that the cake bakes evenly. Tube pans come in a variety of shapes and sizes, with Angel Food Cake Pans and Bundt Pans being the most common. Except for Angel Food Cake, fluted pans should be generously coated with butter or shortening, then dusted with flour for easy removal from the pan.

### **Angel Food Cake Pans:**

Angel Food Cake is baked in a tube shaped pan that is ungreased, allowing the cake to raise high by clinging to the sides of the pan, and then turned upside down after baking so the cake does not collapse while cooling. An Angel food cake pan should not be non-stick, allowing the cake to raise by clinging to the sides of the pan and almost doubling in size during baking; and it should include either "feet" that the pan sits on when turned upside down, or a tube that is wide enough to fit over the top of a glass bottle or wine bottle. A pan with a removable bottom makes removing the cooled cake from the pan, and clean-up easier.



### **Bundt Pans:**

Bundt is pronounced "bunt" with the "d" being silent. A Bundt cake is baked in a special



pan called a Bundt pan, a ring shaped pan with fluted sided, originally created to prepare German Kugelhopf cake. National Bundt Pan Day is November 15th. The modern Bundt pan was developed by the Nordic Ware company in 1950, and its fame rose after a Pillsbury-sponsored baking contest in 1966. The 9 x 4½ inch Nordic Ware Bundt Pan is my favorite, and can be used for many cake recipes.



#### **Fluted Tube Pans:**

These pans are fun to use, producing a fancier cake than a basic layer cake. Pans such as Bavaria shape, castle shape, chrysanthemum shape, star shape, heart shape are just a few of the fun shapes to choose from.



#### **Kugelhopf Pans:**

Kugelhopf pans are for baking Kugelhopf, A European cake baked in a special Kugelhopf pan which is a deep, round, tube pan with ornate fluting, and a narrow center tube. The cake is a sweet yeast cake studded with raisins, nuts, and candied fruits, and has a round pyramid shape when the cake is unmolded.



### **PIE AND TART PANS**

Pie pans are available in various sizes and depths. The amount of pie filling will normally determine the type of pie pan to use.

#### **Traditional Pie Pans:**



Most pie recipes are written for a 9 inch pie, and the pie pastry and ingredients will normally fit in a 9x 1½ inch Pie Pan, such as a Pyrex pan with oven proof glass. Oven proof glass pie pans are about the best for baking pies as they are an excellent heat conductor, they allow the bottom crust to brown well, the transparency of the glass

allows you to see how the crust is browning, the surface is not marred when cutting with a knife, and they are easy to clean.

Ceramic and stoneware pie pans are beautiful to use and serve from, and the many colors available make them fun to use for holidays and attractive when serving guests.



If using a metal pan, aluminum with a dull satin finish is the best for conducting heat. These pans are not as pretty; however they will not break if dropped. Dark metals can cause the crusts to over-brown and their coated surface can be marred with a knife.



Disposable aluminum pans are inexpensive and handy for freezing and gift-giving, but the thin construction makes these pans a poor heat conductor.

#### **Deep Dish Pie Pans:**

Many ceramic and stoneware pans are available in deep dish, and are used when you have a larger quantity of pie filling. The fluted tops enable you to create a beautiful edge with minimal effort.



#### **Flan Rings:**

A flan ring is a metal ring with no fluting around the sides, and no bottom. The ring is set on a baking sheet that is lined with parchment paper or a non-stick baking mat, and then filled. The baking sheet serves as the bottom of the pan. Flan rings are used to shape open-faced tarts, pastry shells, and some candies.



#### **Tart Pans:**

Tart pans normally have a fluted edge and may come in round, square, or rectangular shapes. They often have a removable bottom which makes it easy to remove the tart without damaging the delicate crust. Since tart pans are normally shallow, about 1 inch deep, the tart crust starts equally along with the filling.





### **Tartlette Pans:**

Small tartlette pans are designed as a one-serving size, perfect for buffets or teas. Six 4 or 4½ Tartlette pans will normally replace one large 9 inch tart recipe. Tartlette pans can also be used to make individual cakes and muffins.



### **Tarte Tatin Pan:**



A classic Tarte Tatin pan is 9½ inch diameter copper, lined with tin or stainless steel, with handles on the sides to make unmolding easy. Tarte Tatin is a caramelized upside-down apple tart, a classic French dessert. The pastry is placed over the caramelized apples before baking, and then after baking, the tart is turned out of the pan so the pastry is on the bottom.

## **SPECIALTY PANS, MOLDS, AND DISHES**

### **Baba Molds:**

Baba molds are tall straight-sided, cylindrical shaped molds about 1½ to 3 inches in diameter, and 1½ to 4 inches in height. They are specifically designed for the classic yeast-raised sweet cakes called Babas. These same molds can be used for individual parfaits, mousses, and ice cream desserts.



### **Brioche Molds:**

A brioche mold is a deep, beautifully fluted round mold, made of tinned steel. They are specifically made for baking the traditional French knot-shaped brioche loaf. A small brioche mold can also be used for baking small cakes, muffins, and individual sweet breads. A large brioche mold can be used for larger cakes and sweet breads.



### **Ceramic Baking Dishes:**

Ceramic dishes come in round, oval, and rectangular shapes, and a variety of colors. They are perfect for baking crustless fruit





desserts such as fruit crisps, cobblers, crumbles, and bread puddings, allowing your dessert to go from the oven to your table.

#### **Charlotte Molds:**



A classic French Charlotte mold is a round, tinned steel mold shaped like a straight-sided bucket, and a handle on each side. A charlotte is lined with lady fingers, madeleine's, cake, or occasionally bread, and then filled with mousse, custard, cream, or fruit.

#### **Custard Cups:**

These are 6 ounce cups for baking custards. Their small size are also good for holding cooked puddings or other desserts, and are also useful for holding pre-measured ingredients when prepping ingredients for cookies or cakes.



#### **Double Boiler:**

A double boiler is a set of two pans nested together, with enough room in the bottom pan for 1 or 2 inches of water. Double boilers are used to cook or heat foods that need gentle heat, such as melting chocolate. The water in the bottom pan is brought to a simmer, and the second pan is set on top.



#### **Popover Pans:**

Popover pans have deep, narrow cups, which force the popover batter to rise up and out, producing the typical tall popover shape. Popover pans made of a dark metal produce the best crust with a golden brown color. A muffin pan may be substituted, however the finished popovers will not be as tall.



#### **Savarin Mold:**



A savarin mold is a ring mold with an extra-large hole in its center. A savarin mold is made specifically for the classic French Savarin dessert which is a light, yeast-risen sweet cake soaked with liqueur syrup. However a Savarin mold can also be used for other cake and quick bread batters, ice creams and mousses.



### **Steamed Pudding Molds:**

A pudding steamer is used for steaming some puddings and breads. These pans are typically molded of aluminum or tinned steel with a tube in the middle and a clip-on watertight lid to keep the bread or pudding moist while baking. Breads, such as Boston Brown Bread, and puddings such as a traditional Christmas pudding are best when baked in a pudding steamer. After placing the batter in the steamer, the lid is clamped on and the pan is set on a rack in a kettle of 1 or 2 inches of simmering water. The bread or pudding is steamed on the stovetop or in the oven for 1 to 3 hours until cooked through, resulting in a dessert that is dense, moist, chewy, and beautifully shaped when it is turned out.



### **Madeleine Pans:**

Madeleine's are a small and tender French cake that is baked in a special pan called a Madeleine pan with shell-shaped imprints. The Madeleine pan, also known as a Madeleine plaque, must be generously greased and floured to prevent the delicate cakes from sticking to the pan. Madeleine's are sometimes thought of as a cookie, but are actually little buttery spongy cakes, sometimes delicately flavored with lemon, orange, or almond. Madeleine pans usually have 8 or 12 shallow shell-shaped imprints, and come in tinned steel, metal with a nonstick finish, and pliable silicone. A Madeleine pan can also be used to make other formed cookies, such as shortbread, tiny muffins, and petits fours.



### **Panettone Molds:**

Panettone is normally baked in a paper panettone mold. It is the perfect way to bake, serve, and give as a gift all in one. Panettone is sweet, yeast-risen bread, filled with raisins and candied peels that are a Christmas specialty of Milan, Italy. It has a tall cylindrical shape with a domed top, and is eaten as a breakfast bread, afternoon tea, or dessert.





### Soufflé Dishes:

Soufflé dishes are round, with deep, straight sides and decorative ridges on the outside. They range in size from  $\frac{1}{4}$  cup up to 8 cups. Smaller soufflé dishes, also called ramekins, can also be used to bake individual soufflés, custards, bread puddings or crisps or cobblers. The smaller sizes are also useful for holding pre-measured ingredients when prepping ingredients for cookies or cakes.



### Mixing Bowls:



A good set of mixing bowls will be your constant companion while baking, used for mixing, whipping creams or egg whites, preparing ingredients, raising breads, or just storing food in the refrigerator.

My favorite bowls are a set of clear glass nesting bowls, providing several sizes to choose from depending on the task at hand, and with several bowls you don't have to wash and reuse the same bowl as often. Glass bowls are also microwave safe and can be used on top of a double boiler. Have at least one small, one medium, and one large mixing bowl, and having two of each is even better. Having one extra-small and one extra-large bowls are also useful to have.

Stainless steel bowls are another good all-around choice; they are lightweight, durable, and can be heated, but can tend to dent easily and are not microwave safe.



Crockery bowls are very attractive, and normally oven-safe, however they are heavier and can chip if you're not careful with them.

Copper bowls are beautiful and expensive. However no bowl is better for beating egg whites into meringue. A chemical reaction occurs between the egg protein and the copper, giving the egg whites greater volume and stability than when they are beaten in a stainless steel or other bowl. Copper is often used





when making candy and sugars since it is an excellent conductor of heat.



Acrylic bowls come in fun colors, and are lightweight, but may not be micro-wave safe.

Plastic bowls and aluminum bowls are the least desirable. Plastic will absorb odors and fat which can transfer into your ingredients. Aluminum bowls will react to acidic foods to impart a metal taste.

## MEASURING TOOLS

Good quality measuring spoons and cups or a scale is a must for baking. Baking is a precise science and all measuring should be precise to ensure successful baking.

### Measuring Spoons:

Basic measuring spoon sets include measures for 1/4 teaspoon, 1/2 teaspoon, 1 teaspoon, and 1 tablespoon. Larger measuring spoon sets may also include 1/8 teaspoon, 3/4 teaspoon, and 1/2 tablespoon. My favourite measuring spoons are stainless steel as they have sharp precise edges and provide the most accurate measuring.



Measuring spoons are used for measuring small amounts of ingredients such as spices, leaveners, and extracts, and very small amounts of liquids. Pour liquids, such as vanilla extract, to the rim of the spoon, level dry ingredients, such as salt or baking soda with a straightedge. It's helpful to have two sets of measuring spoons so you don't have to wash and dry the spoons to measure multiple ingredients.

### Dry Measuring Cups:

Basic dry measuring cups are purchased in a set that includes 1/4 cup, 1/3 cup, 1/2 cup, and 1 cup. Larger measuring cup sets may also include 1/8 cup, 2/3 cup, 3/4 cup and 1 1/2 cup measures. A dry measuring cup does not have a pouring spout, instead they should have a straight edge to allow for easy leveling. Dry measuring cups are used to measure all dry ingredients such as flour, sugar, and oats, also for semisolid ingredients such as jam, shortening, sour cream, and peanut butter.





When measuring, add the ingredient into the measuring cup so that it is mounded and overfull, and then level it off by sweeping a straight edge, such as a metal ruler or knife, across the top of the measuring cup, leveling off the ingredient. My favorite measuring cups are stainless steel as they are the most durable and have the best edges, however you may also find acrylic cups you prefer. It's helpful to have two sets of measuring cups so you don't have to wash and dry the cups to measure multiple ingredients.

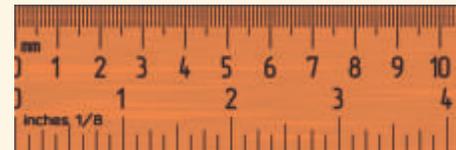
### **Liquid Measuring Cups:**

All liquid ingredients, such as water, milk, or juice are measured in a liquid measuring cup. Liquid measuring cups should be made of clear glass or plastic, have a pouring spout, and have clear measurement markings on the side. It is handy to have a 1 cup measure, along with a 2 cup and 4 cup measure for most baking projects. Liquid measuring cups are also handy for warming milk or melting butter in the microwave. To accurately measure, place the measuring cup on a flat surface and pour the liquid in up to the marking for the amount you need. Let the liquid stop swishing around to determine the level it is at.



### **Ruler:**

An everyday 18 inch clear plastic, metal, or wood ruler is a helpful tool for measuring pans, measuring rolled pastry dough, cutting bar cookies into uniform sizes, as a guide when splitting cakes into equal layers, or measuring 1 inch cuts for cinnamon rolls. The ruler also provides a neat, straight cutting edge and is easy to wash.



### **Scales:**

Professional bakers use scales to weigh ingredients instead of using measuring cups to measure by volume, for the simple reason that weight measurements are more precise and accurate. Scales are used to measure dry ingredients, along with nuts, dried and fresh fruits, and chocolate, and to measure out portions of dough. The scale is also helpful to determine if multiple cake pans have the same amount of batter.





There are two types of scales, digital and mechanical, with digital scales being the most accurate. A thin, battery powered digital scale with a flat platform for weighing is affordable and is the easiest to use for most home bakers. Look for a scale that measures up to about 10 pounds, has an automatic shut-off that will remain on for at least 5 minutes, has a "tare" button to reset the scale to zero in order to measure the next ingredient, and the ability to change from pounds and ounces to metric. In addition, all the buttons and controls should be on the front of the scale, not the bottom or the back of the scale.

## STIRRING AND WHISKING TOOLS

### Rubber or Silicone Spatulas:

Rubber or Silicone spatulas are one of the most versatile and important tools in a baking kitchen. Rubber spatulas have mostly been replaced with silicone spatulas which are easier to clean and have a higher heat resistance. Spatulas have many uses including scraping batters down from the sides and bottom of a mixing bowl, spreading fillings, stirring stovetop custards and chocolate while heating, folding lighter ingredients into heavy batters, scrambling eggs, and more.



Spatulas come in a variety of sizes and may be made of a solid piece of silicone or have a silicone blade attached to a wooden, plastic or stainless steel handle. A small 1 inch spatula is handy for scraping out the inside of measuring cups and containers. A 2 inch spatula is good for stirring, blending, and scraping the sides and bottom of a mixing bowl. A larger 3 inch spatula is best for folding ingredients together.

### Whisks:

A wire whisk is another versatile baking tool, used to whisk or stir wet or dry ingredients together, beating egg whites or cream, stirring ingredients as they heat in a saucepan and folding ingredients together. Whisks come in various sizes and strength of wire. The stronger the wire, the heavier the task the whisk can perform. A sauce whisk is long and narrow, designed to blend mixtures, reach into the corners of





a saucepan, and whisk out any lumps without incorporating a lot of air into the mixture. A round, fat balloon whisk is designed to add air to mixtures and is the best choice for whipping egg whites and heavy cream. A small mini whisk is also helpful for small jobs such as beating eggs or egg yolks.

### **Wooden Spoons:**

Nothing beats a good set of wooden spoons in the kitchen. Wooden spoons are strong and durable, withstand heat, won't scratch nonstick pans, and perfect for stirring almost anything, including hot liquids on the stovetop. Purchase spoons that are well made, strong, and made from a hard wood.



## **PIE AND PASTRY TOOLS**

### **Bench Scraper:**



Also called a board scraper, or dough scraper; this is one of my favorite tools in the kitchen. Bench scrapers measure about 6 by 3 inches, have a straight edge, are normally marked with measurement markings, and have a plastic or wooden handle or curved edge for gripping.

Bench scrapers can be used for everything from cutting dough, to scraping flour or crumbs off a pastry board or counter, loosening dough from a work surface as you knead, scoring certain cookies such as shortbread, leveling a cup when measuring dry ingredients, transferring pastry or bread dough from one place to another, and transferring chopped nuts or chocolate from a cutting board into a bowl. My favourite tool to cut bar cookies is a stainless steel bench scraper; simply push the bench scraper straight down into the cookie for straight cuts.

### **Dough Scraper:**

Also known as a pastry scraper, a dough scraper is a small, flexible plastic scraper that is rounded on one edge and flat on the other. The rounded edge is used to get every last bit of batter, dough, or frosting out of a mixing bowl, or flour and dough bits off your rolling pin. The flat edge can be used to clean your work surface or spread and level batters in pans. A dough scraper is also good for cleaning stuck-on food from pans.





### **Flour Duster:**

Also known as a flour wand or flour shaker, this old-fashioned tool is used to dust a work surface with flour, allowing you to have just a light dusting instead of scattered handfuls of flour. The Flour duster has a ball of coiled metal that is filled with flour, when the handle is squeezed it lets out just a small amount of flour. The flour duster can also be used to lightly sprinkle confectioner's sugar or cocoa on top of cakes.



### **Flour Sifter:**

Flour sifters are used when a recipe calls for sifted flour. The most common sifter is a canister type with either a single mesh screen, or triple mesh screen and a rotating blade that is controlled by a rotary or squeeze handle. Choose a sifter with at least a three-cup capacity. A sifter can sift any dry ingredient, including flour, cocoa powder, and confectioner's sugar.



### **Metal Spatulas:**

Nothing works better for removing baked cookies from a cookie sheet than a thin metal spatula. Choose one that is wide enough to slip under the cookies, a 2½ or 3 inch width is a good size for most baking needs.



### **Non-Stick Baking Mat:**



Non-stick baking mats, normally made of silicon, are truly remarkable. The most widely known name brand is Silpat. No longer do you need to grease a cookie sheet, instead line the pan with a non-stick baking mat and your cookies will just slide off the mat and not stick. These mats are easy to clean in warm soapy water, and will last for years.

### **Parchment Paper:**

Parchment paper, also known as baking paper, is a baker's secret weapon. Parchment paper is used to line baking sheets before baking cookies, ensuring cookies that won't stick to the pan, lining cake pans to





allow cakes to slide right out of the pan, and for folding into cones for piping icing or chocolate. Use a sheet of parchment paper to cover your work surface to make cleanup easier. After using a piece of parchment paper, simply throw it away.

Parchment paper is coated with silicone, making it greaseproof, moisture resistant, and nonstick. It is reusable for some baking projects, especially when lining a baking pan and baking batches of cookies. Parchment paper is sold in sheets sized for half sheets 13 x 18 inch, and full sheets 18 x 26 inch, precut triangle to make pastry cones or rolls so you can determine the size you want to tear off and use.



**Pastry Bag and Decorating Tips:**



Pastry bags and pastry tips are used to pipe decorative borders of icing or chocolate onto cakes and cookies, or for pressing out small cookies or chocolate shapes.

Pastry bags are available in plastic lined canvas that is reusable, or disposable bags made of parchment or plastic. Icing is spooned into the bag, and then squeezed out through a decorative metal tip attached to the end of the bag. Reusable pastry bags should be washed in warm, soapy water and dried completely before storing. For very small amounts of frosting or chocolate, you can also use a small resealable plastic bag with a very small piece of the corner snipped off.



Pastry tips, also known as decorating tips, are available in a huge array of designs and sizes. They are made of stainless steel or chrome-plated, and placed in the small end of the pastry bag. When the icing is pushed through it forms the design of the tip. Use a coupler (a plastic ring) when you want to change to different tips using the same icing without first having to empty and clean the pastry bag. Pastry tips should be washed in warm, soapy water and dried completely before storing.

**Pastry Blender:**

A pastry blender, also known as a dough blender, is used to cut butter or other fat into dry ingredients, such as when making piecrust, scones, or biscuits. A pastry blender has





stainless steel wires shaped into a half-moon, with a stainless or wooden handle for gripping. In place of a pastry blender, two kitchen knives also work well for cutting the ingredients together.



### **Pastry Brushes:**

Pastry brushes are used to brush liquid type ingredients onto pastries or breads. For example use a pastry brush to brush butter onto a hot loaf of bread, or an egg wash onto bagels, or milk onto a pie crust, or to wash down the sides of a saucepan when melting and caramelizing sugar. A pastry brush is even helpful for brushing excess flour from dough during rolling, and brushing up spilled flour on the kitchen counter. Choose a high quality brush with either natural bristles or silicone bristles that are securely attached to the handle. High quality pastry brushes are easy to clean with soap and water and should last for years.



### **Pastry Boards and Mats:**

Use a wooden pastry board to roll out perfectly shaped pie crusts, pizza crust, sugar cookies, or bread dough. Some boards are marked with measurements guides so you can roll out the exact dimension you need.

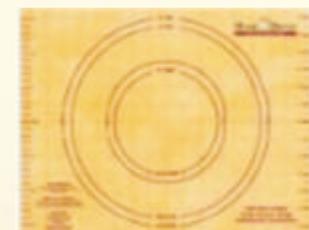


Marble is the best surface for rolling dough and pastry, as the

marble keeps the dough cool. On hot days, you can quickly cool the marble down by placing a bag of ice on the surface for 15 minutes before working with your dough. Marble boards or slabs normally have small feet on the underside to protect your counter top from scratches. Marble is heavy and



generally more expensive, but worth the investment for serious bakers.



Pastry maps are a non-stick surface that easily releases the dough. Pastry mats are thin, lightweight, and easy to clean and store.

### Pastry Crimper:

A pastry crimper is a small, stainless steel tweezer with serrated tips. It is used to seal the top and bottom crust of a pie together, or to decoratively finish the edge of a single-crust pie or tart pastry shell.



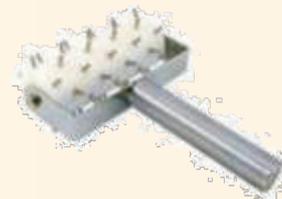
### Pastry Cutters:



Similar to cookie cutters, pastry cutter are normally very small, less than 2 inches in size, and are used to cut shapes such as leaves or fruits from pie-crust to decorate the top of a pie. The cut-out shapes can be laid directly on the filling, or placed on the top crust, or around the edge of the pie.

### Pastry Docker:

A pastry docker is a cylinder, about 5 inches long, with sharp spikes at ½ inch intervals around the surface. It is used to poke holes in pastry doughs, such as pie dough or puff pastry. In place of a pastry docker a fork can also be used.



### Pastry Wheel:

A pastry wheel is used to cut strips of pastry, such as for making a lattice top pie crust, or pieces of dough for turnovers or ravioli. Pastry wheels may have a smooth blade or have a jagged or fluted edged blade.



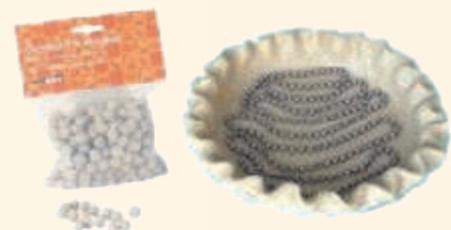
### Pie Birds:



Pie birds are an old-fashioned way of venting a pie to allow the steam and bubbling juices to escape from the pie while baking. Pie birds are ceramic figurines placed in a cutout portion of the top pie pastry. Not really very practical, it is easier to just slash or cut vents in the pie pastry before baking to accomplish the same task.

### Pie Weights:

When making a blind baked pie crust, pie weights, which are small reusable ceramic balls about the size of marbles, are poured into the pastry lined pie pan before





baking to prevent the pastry from puffing up and shrinking. In place of ceramic pie weights, you can also line the pastry with parchment paper and then fill with dried beans or uncooked rice.

A pie chain is a beaded chain that you coil onto the unbaked pastry. After baking, use tongs or a fork to list the hot chain out. A pie chain should be 6 or 10 feet long to completely cover the pastry.

### **Piecrust Shield:**

The edges of a pie are the most susceptible to burning as a pie bakes. A piecrust shield is a lightweight aluminum ring that is placed around the edge of the pie to prevent the edges from over baking. In place of a piecrust shield, strips of aluminum foil work just as well.



### **Rolling Pin:**



A good rolling pin is essential for rolling pie pastry, sugar cookie dough, and bread dough. There are two basic styles of rolling pins, dowel and ball bearing. When deciding which to buy try it out on a flat surface and choose the one that is most comfortable for you to use. A rolling pin, if properly taken care of, should last a lifetime. Never submerge it in water or place in the dishwasher. To clean simply wipe it down with a warm damp cloth and allow to air dry.

A dowel rolling pin is a single piece of rounded wood, some have tapered ends, and some are long and straight. To roll, place your hands in the center of the pin and roll from the fingertips to the palm of your hand and back again. My favourite is a French tapered pin, perfect for rolling a circular pastry.



Ball bearing pins have a long barrel in the center, made of wood, marble, metal, or plastic, that moves separately from the handles. The handles are what bear your weight as you are rolling dough.



### Rolling Pin Rings:

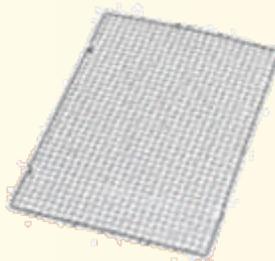
Also called rolling pin spacers, these are rubber rings that slip onto opposite ends of your rolling pin, and are ideal for getting your dough to an even, uniform thickness. The rings raise the pin from the counter a precise distance according to the thickness of the rings being used. The thickness of the dough is determined by the space between the pin and the counter.

### Rolling Pin Covers and Pastry Board Cloths:

These cotton gauze cloths are designed to keep pastry dough from sticking to the rolling pin and pastry board. The rolling pin sleeve is a cylinder of gauze that fits over the pin, the cloth is a large square, normally canvas that covers the pastry board or work area on which you are rolling. By rubbing flour into the weave of the cloth and rolling pin cover, you create a nonstick coating, enabling you to roll dough more easily, and allowing less flour to be absorbed into the dough. The pastry cloth also allows you to easily rotate the pastry as you are rolling.



### Wire Cooling Racks:



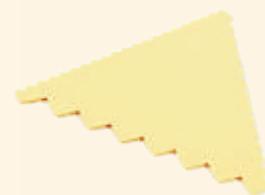
Wire cooling racks are a necessity for setting just-out-of-the-oven hot baking pans to cool. Hot pans placed on a flat surface can cause the baked item to become soggy, due to condensation that forms under the pan. Cooling racks are also helpful to use when drizzling icing or chocolate on top of cookies, cakes, or pastries as the icing drips thru the rack instead of forming a puddle.

Cooling racks are sold in various sizes, including round, square, and rectangular shapes. They should have feet of at least ½ inch that raise them above the counter for good air circulation. Have at least one rack that is large enough to hold several batches of cookies.

## CAKE TOOLS

### Cake Comb:

A cake comb is a fun tool to use to make thin, parallel lines around the outside edge of a layer cake for a professional finish. After the





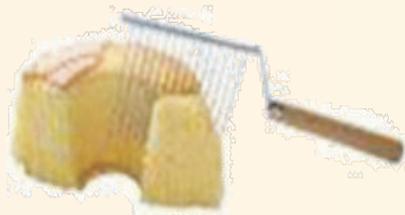
cake is frosted, the comb is placed against the side of the cake, and then the cake is turned, or spun around on a cake turntable to make the lines all around. A kitchen fork or serrated knife can do the same job.

### **Cake Leveler:**

A cake leveler is used to slice cakes into even, horizontal layers. It is a wide, low, U-shaped metal frame that sits on plastic feet, and a thin, sharp serrated cutting blade sits horizontally between the sides of the frame. The height of the blade is adjustable so that cakes of different heights can be cut. The cake is pushed against the cutting blade to cut the layers.



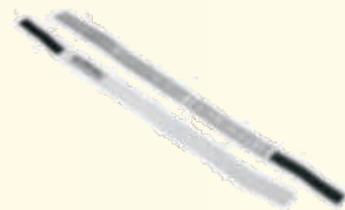
### **Cake Spreader:**



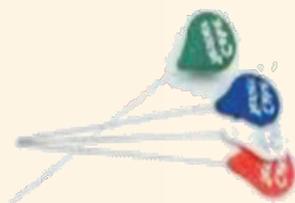
Also called an angel food cake cutter, this tool looks like a long-handled hair comb, made with thin, long, evenly spaced teeth made of metal. When it is lowered into an angel food cake like a knife, it severs each piece from the whole cake without crushing the delicate crumb.

### **Cake Strips:**

Cake strips are heat-resistant metallic fabric strips that is moistened, then wrapped around the outsides of a round cake pan before the cake is baked. They insulate the pan, keeping the edges of the cake pan from heating more rapidly than the center, to produce a more evenly baked, level cake. The strips come in several lengths and are reusable.



### **Cake Tester:**



A cake tester is a fun little tool to have if you bake lots of cakes, made of thin metal and a decorative top, and used to pierce a baked cake to test for doneness. Of course the age-old substitute for testing the doneness of cakes is a long toothpick, or long wooden skewer. In a pinch, you can still use the method of olden days and pull a straw out of the kitchen broom to test your cake (but don't use this unless you've cleaned it first).



### **Cake Turntable:**

A cake turntable, also known as a cake stand, makes frosting a cake, or more elaborate cake decorating easier. A cake turntable is like a lazy Susan, it should sit on a small pedestal and turn easily without wobbling.



### **Cardboard Cake Rounds:**

These are inexpensive corrugated paper rounds for frosting and decorating cakes or transporting cakes from one location to another. After frosting a cake, and to avoid damaging the sides, slip the tip of a paring knife under the cardboard, lift the cake slightly at an angle, and slip your hand underneath to finish lifting it. The finished cake can then be placed on a serving plate. Cardboards cake rounds are also useful for bringing cakes and other pastries to parties, since you don't have to worry about retrieving your serving platter.



### **Decorating Stencils:**

Stencils are flat, round pieces of plastic, about 9 inches in diameter. Designs, such as hearts and flowers are cut out of the center of the stencil. The stencil is placed over the top of a cake, confectioner's sugar or cocoa is dusted over the top, and then the stencil is removed leaving a beautiful design on the cake.



### **Offset Spatula:**

An offset spatula has a long, narrow, flexible stainless steel blade that allows easy frosting of cakes. You can easily spread frosting or whipped cream around the sides of the cake with this spatula, and it is flexible enough to use to create fanciful frosting swirls on top. A small offset spatula is good for frosting cupcakes or cookies.



## **COOKIE TOOLS**

### **Biscuit Cutters:**

A Biscuit cutter, either plain or fluted, will help produce high-rising biscuits as the biscuit



cutter has a sharp edge to produce a clean cut, cutters that have a dull edge will compact the dough and the biscuits will not rise as well when baking. Round biscuit cutters are normally made of tin or stainless steel, ranging in size from 1½ to 3 inches in diameter. The cutter should be at least 1 inch deep to cut through the thickest biscuit dough. A biscuit cutter can also double as a cookie and scone cutter or to cut small cake rounds to frost for individual servings or petite fours. Shop here for biscuit cutters.



### Cookie Cutters:



Cutting sugar cookies with a beautifully shaped cookie cutter is a tradition in many families, especially during holidays. There are hundreds of cookie cutter shapes available ranging from Christmas, Thanksgiving, Halloween, and Valentine's Day shapes, along with alphabets, numbers, animals, stars, and flowers. Whatever shape cookie you want to create, there is most likely a cookie cutter shape available. Most cookie cutters are made of tin, plastic, copper, or aluminum. Most work well, however the more flimsy ones will easily be bent out of shape. Purchase ones that seem sturdy, have a sharp cutting edge, and are at least ½ inch deep. The most beautiful, and typically the most expensive cutters are made from copper, and along with being quality cutters they are beautiful to display in your kitchen. Shop here for cookie cutters.



### Cookie Molds:



Many traditional European cookies, such as Scottish shortbread, and German Springerle cookies, are made with a cookie mold. Most cookie molds are made of wood or stoneware with a raised design. The cookie dough is pressed into the mold to acquire the design, and then baked. Depending on the mold the cookie may be baked directly in the mold, or turned out of the mold before baking.

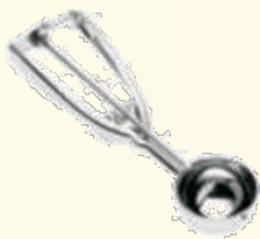


### Cookie Press:

A cookie press is used to extrude cookies into various shapes. The cookie dough is loaded into the hollow tube of the press, and then the plunger is used to press the dough out through a decorative plate fitted into the end. Spritz cookies are a traditional cookie that uses a cookie press. An alternative to a cookie press is to use a pastry bag fitted with a large star tip. Shop here for cookie presses.



### Cookie Scoop (ice cream scoop):



A cookie scoop is ideal for making uniform-sized cookies. It gives you the ability to quickly scoop up the dough and deposit the dough on the cookie sheet. Purchase scoops that are easy to squeeze to keep your hand and wrist from tiring. If the dough sticks to the scoop, you can spray with a nonstick baking spray. Shop here for ice cream scoops.

### Cookie Stamps:

Cookie stamps are often made of terra-cotta, and are used to stamp designs into the top of shortbread-type cookies. The dough is normally rolled into a ball, and then flattened with the stamp, creating an impression in the cookie which remains after the cookie is baked. Shop here for cookie stamps.



### Springerle Rolling Pin:



A Springerle rolling pin is normally very intricately carved, used for making traditional holiday German Springerle cookies. The anise flavored dough is rolled with the Springerle rolling pin, pressing the carved shapes into the dough. The dough is then normally left to dry overnight before baking. Springerle cookies can also be made in a cookie mold.



## BREAD TOOLS

### Baking Stone:

This is a large, flat stone that is placed on the bottom of the oven, or the bottom shelf if your oven has an electric element on the bottom. Baking stones are used to bake free-form bread loaves, flatbreads, and pizza, and mimic the heat of a brick or stone oven. The baking stone creates a dry and crispy crust by drawing moisture away from the crust as it bakes. The stone should be the thickest you can find, at least ½ inch thick, to hold heat better, and needs to be preheated for up to 1 hour before baking.

### Bannetons and Brotforms:

European-style rustic breads are traditionally given their second rise in shaping baskets before being tuned out onto a baking stone to bake. The baskets are floured before the dough is added. A French banneton is a woven willow basket, lined with linen or canvas cloth. The cloth is dusted with flour to draw moisture from the dough as it rises, making the baked crust chewy. A German Brotform, made of wood, leaves circular marks on the dough, making an attractive loaf.



### Baguette Pan:

Is there any better treat than a piece of crusty French bread or baguette hot out of the oven, possibly slathered with sweet butter? Now you can replicate a bakery loaf right out of your home oven with a baguette pan. The long troughs hold the dough in shape while the perforations allow for even browning from top to bottom, creating that essential golden, crispy crust.



### Couche:

Artisan bread bakers use a canvas cloth, called a couche, to create crusty baguettes. Place shaped baguettes in the folds of the floured cloth; when risen, roll them onto a peel, then off the peel onto your hot baking stone.



### **Doughnut and Bagel Cutter:**

This is similar to a round biscuit cutter, but with a smaller round cutter in the center to make the doughnut or bagel hole.



### **Lame:**



A Lame is a French tool with a curved razor blade set into a handle. A lame is used to slash the top of bread, such as baguettes, just before it goes into the oven. The slash allows the bread to expand fully to its proper shape as it bakes. A small, very sharp kitchen knife can also be used to slash the bread dough.

### **Peel:**

A peel is a wide, flat, usually long-handled wooden board, used to slide yeast breads, flatbreads, and pizza onto a baking stone in a hot oven.



### **Pizza Cutter:**

A pizza cutter, also known as a pizza wheel, is not only used to cut baked pizza, it is also a great tool for cutting bar cookies, cutting unbaked dough into smaller pieces, or thin strips of pastry for a lattice pie crust. A pizza cutter consists of a sharp metal disk attached to a handle, with a hand guard in-between to protect your fingers.



### **Rising Buckets:**

A lidded rising bucket is a 2 to 6 quart acrylic or plastic bucket with measurements on the side, making it easy to judge when the dough had doubled or tripled in size. An alternative is placing your dough in a large mixing bowl and covering with a small kitchen towel.



## **FRUIT TOOLS**

### **Cherry Pitter:**

A cherry pitter easily extracts the pits from fresh cherries, indispensable when fresh cherries are in season. Cherry pitters are normally available in stainless steel, aluminum or plastic, with a spring-loaded pitting





mechanism. Simply place a cherry in the little metal cup and depress the plunger, pushing the pit out and leaving the fruit whole. A cherry pitter can also be used to pit olives.

#### **Citrus Juicer, Citrus Reamers:**



There are many different types of juicers available, but my favorite is an old-fashioned glass reamer. It's easy to use and easy to clean, and makes quick work of juicing a lemon or orange. If you like making large amounts of juice, an electric



juicer is a good investment.

#### **Citrus Zester:**



Citrus zesters are stainless steel strips with tiny razor-sharp edged holes. When you scrape a whole orange or lemon across the zester it removes the colored and flavorful part of the fruit (the zest), without including the bitter white pith underneath. This tool can also be used to finely grate chocolate, hard cheeses, whole nutmeg, and fresh ginger.



#### **Melon Baller:**



Melon ballers come in a variety of sizes, used for creating melon balls for fruit salads. However this little tool doesn't stop there. It is also great for coring apples and pears, forming small chocolate candies such as truffles, and shaping small balls of cookie dough.

#### **Strawberry Huller:**

This tool is a small, V-shaped piece of metal or plastic with serrated ends to remove the green hull from the top of the strawberry. An alternative is to use a small sharp paring knife.



## KNIVES

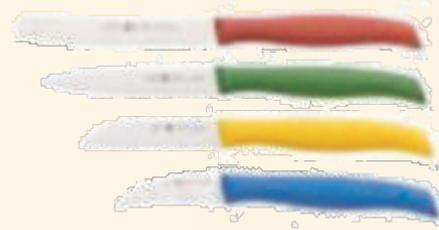
### Heavy Duty Chef's Knife:



A large 8 or 10 or 12 inch chef's knife is essential for cutting, chopping, and slicing fruits, chocolate, and nuts.

### Paring Knife:

A 3 or 3½ inch paring knife can be used for many tasks, such as peeling and paring fruits, cutting small pieces of fruit, cutting decorations from pastry, and loosening cakes and other baked goods from their pans.



### Serrated Bread Knife:



A bread knife should have at least a 10 inch blade, and is ideal for splitting cake layers in half, slicing breads, and slicing some cakes and tarts.

## THERMOMETERS

### Instant Read Thermometer:

An instant-read thermometer registers the internal temperature of a baked item within 15 seconds or so. This allows you to quickly check water temperatures, or the doneness of baked goods such as a cake, pastries, custards, or yeast bread quickly, allowing the oven door to be open for a minimal amount of time.



### Candy Thermometer:

A candy thermometer is very useful for cooking sugar syrups and caramels. A candy thermometer has a mercury bulb with a long glass column. It is normally clipped to the inside of the pan, directly in the syrup but not touching the bottom of the pan, allowing you to watch as the syrup heats to the correct temperature.



### **Oven Thermometer:**

An oven thermometer is useful for checking the accuracy of your oven. You can also move the thermometer to different positions in your oven to check for hot spots. An oven thermometer should be a mercury thermometer that either hangs or sits on the rack. Check the temperature after you have preheated the oven, then adjust the heat up or down as needed if the actual temperature varies from the original setting.



### **SMALL ELECTRICS**

#### **Blender:**

A blender is a great tool for pureeing fruits and vegetables, mixing bar drinks and smoothies, chopping ice, making dips, and chopping small amounts of nuts. Blenders will chop, mix, whip, and blend almost anything.



#### **Bread Machine:**

If the old fashioned method of mixing, kneading, and rising yeast breads doesn't suit you, then a bread machine is good to have. Just add the ingredients, close the lid, turn it on, and in 3 or 4 hours have a perfectly baked loaf of hot homemade bread.



I actually prefer making my own yeast dough, including the kneading the rising process. However I do sometimes use my bread machine for making bread dough up to the baking process. After the dough has rising in the bread machine I take the dough out, shape it, and bake in my regular oven.

#### **Food Processor:**

A food processor is an expensive investment; however it is a versatile machine for chopping, dicing, mixing pastry dough, mixing some cookie dough's, and pureeing fruit. Food processors come in various sizes. A good all-around size is a 1½ to 2 quart capacity. I like to use a mini food processor for small jobs such as chopping nuts quickly.



### Hand Mixer:

Not every mixing job in the kitchen requires a large stand mixer, and this is where the hand mixer comes into play. A hand mixer can perform nearly any beating and whipping task that a stand mixer can, except for very heavy cookie and bread dough. I usually use a hand mixer for quick or small jobs, such as beating cream cheese, whipping cream or egg whites, beating egg yolks, and making cake frostings. I also use a hand mixer to make fluffy mashed potatoes.



### Stand Mixer:

A good stand mixer is the heart and soul of a baker's kitchen and worth the price if you love to bake. I love my Kitchen Aid mixer, and except for pies and tarts, is used for most of my baking projects. Stand mixers range in size from 4 quart to 7 quart. The smaller models will serve most home baking needs. But if you like to bake double batches of cookies or bread dough's, then you'll want the larger size mixers. Most mixers come with a whip, and dough hook, and paddle attachments, which are used to knead doughs, beat meringues, and fold batters smoothly together.



## HEAVY EQUIPMENTS

1. Oven
  - ◆ Gas Oven
  - ◆ Coal oven / Bhatti
  - ◆ Electric oven
2. Proving Chamber
3. Refrigerator
4. Dough Mixer
5. Work tables
6. Storage Cabinet
7. Gas Burners



## **Selection and Maintenance Required for the Equipments:**

### **Oven:**

Oven is generally used in all departments of kitchen. Oven can be heated with the help of coal, gas, oil or electricity. The source of heat doesn't matter, what matters is that heat should be always equally distributed and the required amount of temperature should always be available for baking. Ovens also have a proving chamber attached to it. Electric ovens have an thermostat which makes temperature regulation easier.



Oven should be kept lean to prevent any spillage from being caked. Continuous checking should be done and should be cleaned after every used.

### **Proving Chambers:**

Proving chambers are basically cabinets with temperature and humidity control. These are used for the fermentation process for the breads and baked products. These can be separate as well attached with the ovens it self. These chambers are the essential equipment for a baker. Proving chambers should always be kept clean, and water should be periodically changed.



### **Refrigerator:**

The size of a refrigerator always varies from 100 to 380 liters. The choice of a refrigerator basically depends upon the size of a bakery, volume of sales and the availability of other cold storage means. A refrigerator should be frosted and cleaned weekly.

### **Deep Freezers:**

The capacity of a deep freezer varies from 140 liters to 380 liters. Deep freezers should be cleaned and deep frosted every month, and all spillage should be mopped.

### **Dough Mixer:**

Dough mixers are generally used in large bakeries where the volume of sales is high. It is been used for making a dough of around 25-30 kgs dough. This machine should be washed and wiped after every use and should also be serviced regularly.



### **Work Tables:**

These work tables are made up of steel and they last for years. These are basically used for the work to be carried out in the bakery and these are also to be cleaned after every use. These should be daily scrubbed with plastic brush and detergent, wiped and kept in its place.

### **Storage Cabinets:**

These are basically cupboards made for storing of dry items with proper air ventilation. These should be maintained properly and cleaned once in a week.

### **Gas Burners:**

A low pressure gas burner is also quite essential in bakery. Preferably stainless steel should be used. These should be continuously cleaned after every use.





## Exercise

### Activity:-

- Q1) List five small equipment?
- Q2) What is a proving chamber used for?
- Q3) Write the uses of?
- Pie mould
  - Savarin mould

## 1.7 BAKING TEMPERATURES FOR BAKERY PRODUCTS

SLOW (COOL OVEN)	°C	°F
	110	225
	130	250
	140	275
	150	300
	160	325
MODERATE	180	350
	190	375
	200	400
HOT	220	425
	230	450
VERY HOT	250	475

- 
- ❖ Bread temperature- 200° - 220°
  - ❖ Cake temperature- 170° - 180°
  - ❖ Cookies temperature- 175° - 180°

### Exercise

#### Activity:-

Q1) Write the temperature required for baking cakes?

Q2) Write the temperature range for hot oven?

180°C = \_\_\_\_\_°F



## Chapter-2 Hygiene

### 2.0 Unit Overview & Description

- ❖ Overview
- ❖ Knowledge and skill outcomes
- ❖ Resource Materials
- ❖ Duration
- ❖ Learning Outcomes
- ❖ Assessment Plan

2.1 Introduction to Hygiene

2.2 Concept of Hygiene and its Importance in Bakery

2.3 Personal Hygiene

2.4 Work area Hygiene

2.5 Basic First Aid

### 2.0 UNIT OVERVIEW & DESCRIPTION:

#### Overview:

This unit will provide the student information about the importance of hygiene. It will help to understand the requirements for personal hygiene, work area hygiene and basic first aid.

#### Knowledge and skill outcomes:

- i) Understand the concept of Hygiene and its importance.
- ii) Know about personal Hygiene.

iii) Know about work area hygiene.

iv) Understand basic first-aid.

#### Resource Materials:

- ❖ Gisslin, W. *Professional baking*. New York : John Wiley & Sons, c1985.
- ❖ Sultan, W. J. *Elementary baking*. New York: McGraw-Hill, c1969.
- ❖ Sultan, W. J. *Practical baking. 5th edition*. New York : Van Nostrand Reinhold, c1990

**Duration:** Total Hours 14

#### Learning Outcomes:

2.1 Introduction to Hygiene	General Overview
2.2 Concept of Hygiene and its Importance	<ul style="list-style-type: none"><li>❖ Understand the Importance of Hygiene</li><li>❖ Know the concept of Hygiene in Bakery</li></ul>
2.3 Personal Hygiene	<ul style="list-style-type: none"><li>❖ Understand the necessity of Personal Hygiene</li><li>❖ Know how to keep Personal Hygiene</li></ul>
2.4 Work Area Hygiene	<ul style="list-style-type: none"><li>❖ Know the requirements for Work Area Hygiene</li><li>❖ Importance of Work Area Hygiene</li></ul>
2.5 Basic First Aid	<ul style="list-style-type: none"><li>❖ Understand the requirement to learn the First Aid</li><li>❖ Know the basic Do's &amp; Don'ts for First Aid</li><li>❖ Learning to cure some Common Ailments</li></ul>



### Assessment Plan: (For the Teachers)

Unit-2	Topic	Assessment Method	Time Plan	Remarks
2.2	Concept of Hygiene and its importance in Bakery	Exercise: Question & Answer		
2.3	Personal Hygiene	Exercise: Question & Answer		
2.4	Work Area Hygiene	Exercise: Question & Answer		
2.5	Basic First Aid	Exercise: Question & Answer Group Discussion		

## 2.1 INTRODUCTION TO HYGIENE

The word hygiene is derived from Greek word "HYGEIA" meaning the "goddess of health". Hygiene is defined as a science and art of preserving and improving health. Hygiene deals with an individual and a community as a whole.

## 2.2 CONCEPT OF HYGIENE & ITS IMPORTANCE

Concept of hygiene is related to medical, personal and professional practices and to most aspects of living. Maintaining hygiene is important in controlling and reducing spreading of disease and outbreak of unwanted health hazards.

Hygiene practices are implemented for maintaining health and safety of people. Introducing good hygiene practices in day to day life are considered to be good habits by a society while the neglect of hygiene can be considered disgusting, disrespectful or even life threatening.

### Importance of Hygiene:

Plays a vital role in promoting and protecting the health and well being of hundreds of people.

The foods, materials and equipments are subject to constant handling by people at every stage of food production and service therefore helps in maintaining mental, social and physical well being.

## 2.3 PERSONAL HYGIENE

Personal hygiene is the term used for improvement of hygiene of an individual.

For example, making sure that you wash your hands using anti-bacterial soap and dry with a single use paper towel. It is the responsibility of a food handler to take scrupulous care that personal bacteria are not added to food.

The major sources of transfer of bacteria can be hair, skin, teeth, and clothes.

All food handlers must be fresh, well groomed and clean.

Few points for food handlers that they must follow to maintain personal hygiene:

1. The food handlers should take bath daily and even twice a day as body odour is offensive.
2. Food handlers should brush their teeth twice a day after meal.
3. While handling food they should wear clean head gears and prevent touching their scalp.
4. They should not wear any jewelry as they can harbor bacteria in food.
5. Nails should be trimmed on a regular basis and nail polish should be avoided.
6. Feet should be washed and kept clean. Always wear clean socks to avoid perspiration.
7. Food handlers should avoid touching of food when unwell. They should be excluded from work until medical clearance is taken.



### Exercise

#### Activity:-

- Q1) Define Hygiene?
- Q2) Write a seven step personal hygiene routine?



## 2.4 WORK AREA HYGIENE



It is also important to maintain the work area hygiene as it is one of the best ways to protect food from contamination. Keep your work area and equipment clean. Wash them after each use as when you begin to work with a new type of food as anytime contamination could occur.

### **Some ways to keep your work place clean:**

1. Regular cleaning of the work place. e.g. sweeping and dusting
2. Regular cleaning and maintenance of the equipments and utensils.
3. Proper garbage disposal on a regular basis.
4. Develop a pest control system. e.g. pest-o-flash
5. All the cracks and crevices should be sealed or fixed.
6. There should be wire mesh on windows.

### **Exercise**

#### **Activity:-**

- Q1) What do you understand by personal hygiene?
- Q2) Mention any five ways of maintaining personal hygiene?

## 2.5 BASIC FIRST AID

First aid can be defined as the first assistance or treatment given to a casualty for any injury or sudden illness before the arrival of an ambulance or qualified medical assistance/expert.

### Aims of First Aid:

1. To save and preserve life.
2. To prevent the worst condition of the patient
3. To promote recovery of the patient.



### Some do's to be followed while giving first aid to the patient:

1. Do not get panic.
2. Be calm and logical
3. Ask someone to get a doctor.
4. Build up trust in the patient through communication.
5. Never leave the patient alone, continue to talk the patient until ambulance or doctor arrives.
6. Inform the relatives of the patient.

### Some don'ts to be followed while giving first aid to the patient:

1. Do not touch the wound with finger or any other instrument.
2. Do not put unclean dressing or cloth on the wound.
3. Do not allow any crowd to be formed around the patient.
4. Do not remove any cloth unnecessarily.
5. Do not neglect fracture or shock.



## COMMON AILMENTS

### 1. Cuts and Wounds:

This is one of the most common problems faced and is caused by many reasons. They may sometimes cause infection, if not treated properly it can lead to excess of blood loss. The wound should be cleaned with warm water and then dried. Apply antiseptic cream and cover with a sterilized dressing.

### 2. Minor Burnt:

For minor burns hold the injured area under cold water. Do not apply any oil and does not cover with any cloth. Just apply antiseptic ointment.

### 3. Fainting:

Fainting takes place due to reduced blood supply to the brain. The movement of a person should be avoided. Make sure that there is plenty of fresh air. Get the patient seated in a manner that the head is between the knees and hold it there for a minute. Make him down with a head at a slightly lower level than the feet.

### 4. Choking:

This is the most common problem in children as well as adults, as the food goes down the wrong way and may choke the food pipe. In case of choking make the patient stand first and the first aider should stand behind the patient and wrap his arms around the chest. Wrap the wrist on your other hand against the abdomen slightly above the navel and below the ribcage. Rest your wrist on the patient's abdomen. Repeat it several times till the foreign body expels out from the wind pipe.

### Exercise

- Q1) Define first aid?
- Q2) What is hygiene?
- Q3) What care must be taken while giving first aid to a patient?
- Q4) How can we maintain hygiene at work place?
- Q5) What does first aid aim at?



## Chapter-3

### Structure of Wheat Grain

#### 3.0 Unit Overview & Description

- ❖ Overview
- ❖ Knowledge and skill outcomes
- ❖ Resource Materials
- ❖ Duration
- ❖ Learning Outcomes
- ❖ Assessment Plan

3.1 Introduction to Structure of Wheat Grain

3.2 Physical Structure

3.3 Longitudinal Structure

#### 3.0 UNIT OVERVIEW & DESCRIPTION:

##### Overview:

This unit will make the students learn about the structure and composition of wheat grain. It will also help them to know the physical structure as well as the longitudinal structure.

##### Knowledge and skill outcomes:

- i) Understand the structure of the wheat grain.
- ii) Know the physical structure of wheat.
- iii) Understand the longitudinal structure of wheat grain.

##### Resource Materials:

- ❖ Sultan, W. J. *Elementary baking*. New York: McGraw-Hill, c1969.
- ❖ Sultan, W. J. *Practical baking*. 5th edition. New York : Van Nostrand Reinhold, c1990



- ❖ Matz, S. *Glossary of milling and baking terms*. McAllen, TX: Pan-Tech International, c1993.
- ❖ Matz, S. *Ingredients for bakers. 2nd edition*. McAllen, TX: Pan-Tech International, c1996.

**Duration:** Total Hours 12

**Learning Outcomes:**

3.1 Introduction to Structure of Wheat Grain	General Overview
3.2 Physical Structure	❖ Understand the Physical Structure of Wheat Grain
3.3 Longitudinal Structure	❖ Understand the longitudinal Structure of Wheat Grain

**Assessment Plan: (For the Teachers)**

Unit-3	Topic	Assessment Method	Time Plan	Remarks
3.2	Physical Structure	Exercise: Question & Answer		
3.3	Longitudinal Section	Exercise: Question & Answer		

**3.1 INTRODUCTION TO STRUCTURE OF WHEAT GRAIN**

There are several grasses which are grown due to their edible seeds known as cereal of a grain. The various seeds are wheat, barley, oats, corn etc.,

Flour most commonly used in bakeries is derived from a wheat grain. Wheat can be classified according to the colour and hardness of the kernel. It depends on the variety and area where they are being grown.

The several factors which affect the quality of wheat are climate, soil, variety of the seed sown, moisture etc.

Wheat is the annual grass of triticum and it is the majorly grown in most of the countries.

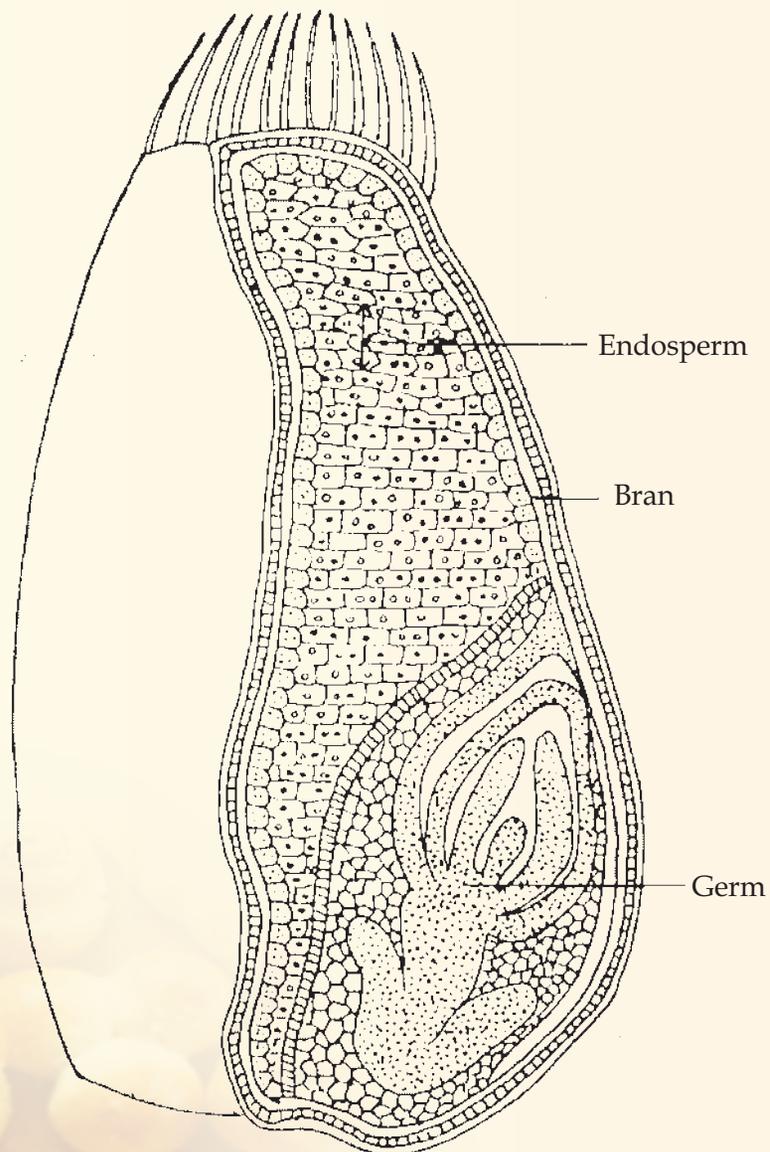


A kernel is called the wheat berry. Kernel is the seed from which the wheat plant grows. It consists of three distinct parts that are separated during the milling process.

The physical structure of wheat majorly consists of:

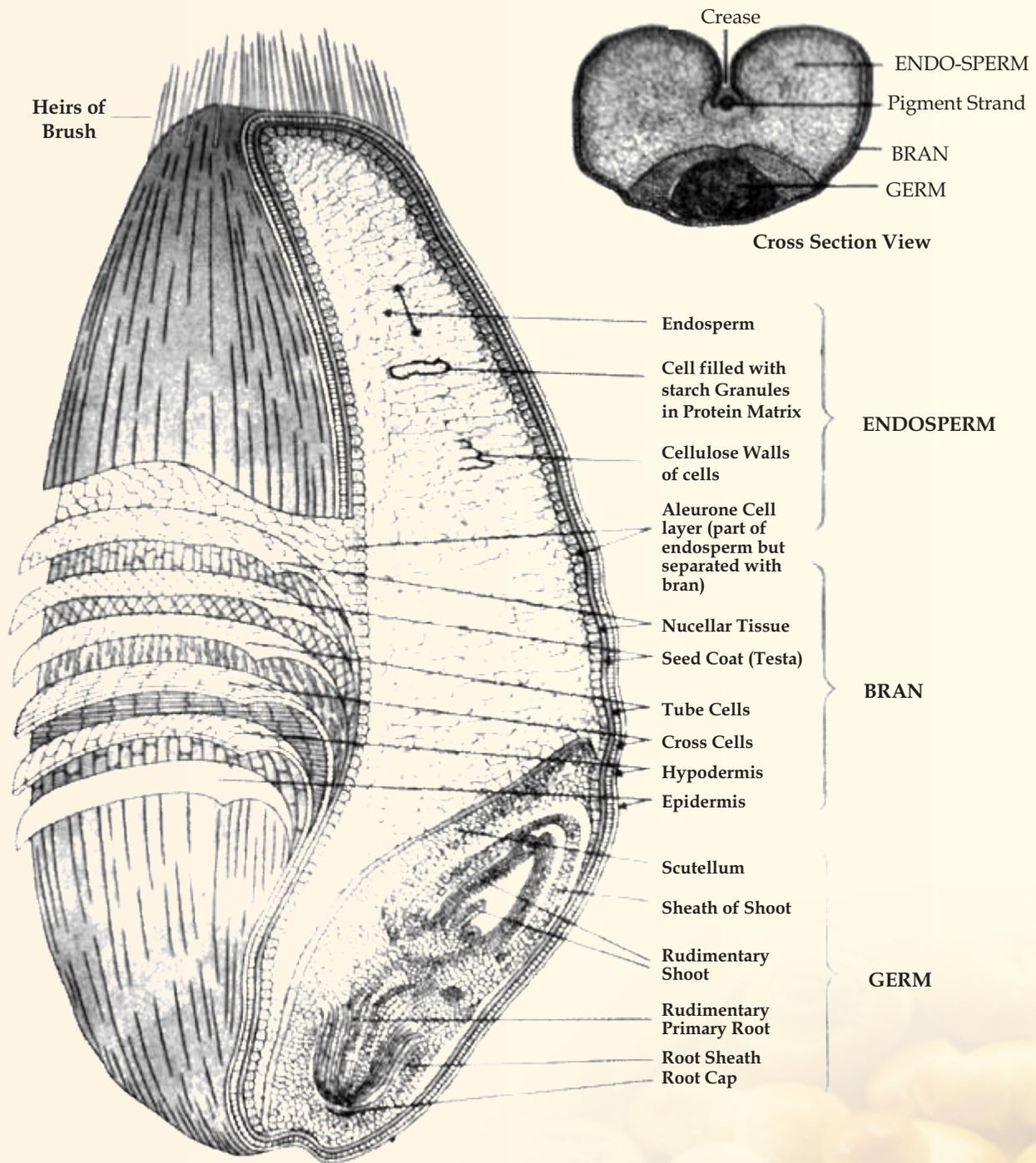
1. BRAN-15%
2. ENDOSPERM-82.5%
3. GERM-2.5%

### 3.2 PHYSICAL STRUCTURE





### 3.3 LONGITUDINAL SECTION





### **Bran:**

Bran consists of 15% of a kernel weight. It is the outer most layer of the wheat grain. It contains small amount of protein, vitamin B-complex, trace minerals and is rich in dietary fiber (insoluble fiber).

**Bran is made up of six layers. These layers are broadly classified as:**

1. Epidermis (outermost layer)
2. Epicarp
3. Endocarp
4. Testa
5. Nuclear tissue
6. Aleurone (innermost layer)

The fourth layer "Testa" comprises the colouring matter which decides the colour of wheat and also influences colour of flour." Aleurone" the sixth layer has a softening effect on flour proteins and contains protease enzyme. Bran is rich in dietary fiber and thus helps in digestion.

### **Endosperm:**

Endosperm consists of 83% of the kernel weight. It is the largest part of the kernel and primary site of starch and protein storage. It is also a source of soluble fat. It has 60-80% of starch and 5-15% of proteins. Endosperm is the major source of white flour.

### **Germ:**

Germ comprises of 2.5% of kernel weight. It is the sprouting or embryo section of the seed. It contains great deal of b-complex vitamin and trace minerals. It is often separated from flour due to its fat content (10%) which limits the shelf life of the product.

Wheat can also be classified into soft wheat and hard wheat.

#### **A. Soft Wheat**

1. Less WAP
2. Less protein content
3. Poor mixing capacity



## B. Hard Wheat

1. More WAP
2. More protein content
3. Good mixing capacity

### Exercise

#### Activity:-

- Q1) What is a kernel?
- Q2) Name the major parts of wheat?
- Q3) What is bran?
- Q4) What are Testa and Aleurone?
- Q5) Draw a longitudinal section of wheat grain?
- Q6) Differentiate between hard wheat and soft wheat?



## Chapter-4 Milling of Wheat

### 4.0 Unit Overview & Description

- ❖ Overview
- ❖ Knowledge and skill outcomes
- ❖ Resource Materials
- ❖ Duration
- ❖ Learning Outcomes
- ❖ Assessment Plan

4.1 Introduction to Milling of Wheat

4.2 Wheat Milling Process

4.3 Roller Flour Mills, Stone Mills

### 4.0 UNIT OVERVIEW & DESCRIPTION

#### Overview:

This unit will familiarize the students with the various wheat milling process. It will provide knowledge about the roller flour mills, stone mills.

#### Knowledge and skill outcomes:

- i) Know the wheat milling process.
- ii) Know the roller flour mills, stone mills.

#### Resource Materials:

- ❖ Gisslin, W. *Professional baking*. New York : John Wiley & Sons, c1985.
- ❖ Sultan, W. J. *Elementary baking*. New York: McGraw-Hill, c1969.
- ❖ Sultan, W. J. *Practical baking*. 5th edition. New York : Van Nostrand Reinhold, c1990



**Duration:** Total Hours 14

**Learning Outcomes:**

4.1 Introduction to Milling of Wheat	General Overview
4.2 Wheat Milling Process	<ul style="list-style-type: none"> <li>❖ Know the process of Wheat Milling</li> <li>❖ Know the Procedure</li> </ul>
4.3 Roller Flour Mills, Stone Mills	<ul style="list-style-type: none"> <li>❖ Understand the Roller Flour Mills and Stone Mills</li> </ul>

**Assessment Plan: (For the Teachers)**

Unit-4	Topic	Assessment Method	Time Plan	Remarks
4.2	Wheat Milling Process	Exercise: Question & Answer		
4.3	Roller Flour Mills, Stone Mills	Exercise: Question & Answer		

**4.1 INTRODUCTION TO MILLING OF WHEAT**

Flour is derived from wheat grain by a process called milling. Essentially it is the separation of the bran and germ from the endosperm and reducing the endosperm to a uniform particle size.

"Milling" is the process in which the wheat is ground into flour, separating the wheat grain into its constituents that is, wheat, bran, and germ. This is done by a sequence of breaking, grinding and separating operations.

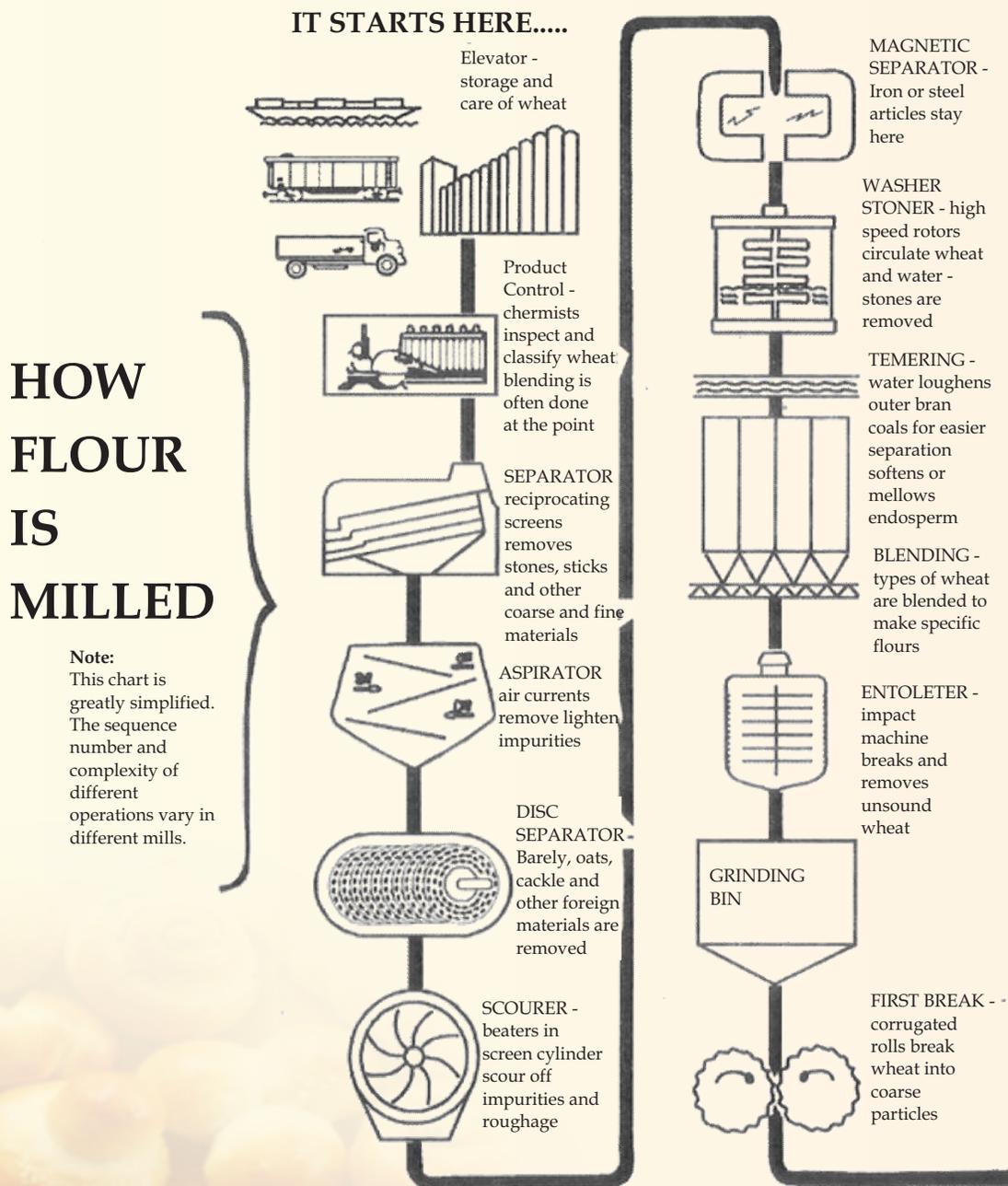
During milling both bran and germ are removed. Bran has sharp edges which tend to cut the cell structure of loaf during proving and thus affecting the volume of bread. Germ has more fat which affects the keeping quality of flour.

In milling the wheat grains are sent through rollers that crack the kernel. The flour is then removed and known as Break flour. The bran particles are set aside. The remaining flour after the removal of bran and germ is sent through smooth rollers where additional germ portions are flaked out. This process is done several times to remove the fatty portions and bran particles. The remaining flour is used for special foods and animal feed, after the impurities have been removed this flour it is called Straight flour.



Short extraction flour contains the finest portion of flour, as it is usually the center of the wheat berry or endosperm, whereas the longer extraction flour contains flour closer to the bran and thus is coarser and relatively darker in colour.

## 4.2 WHEAT MILLING PROCESS







### 4.3 ROLLER FLOUR MILLS, STONE MILLS

#### Roller Flour Mills

Nowadays wheat milling is highly automatic and efficient system known as "Roller Flour Milling".

The process consists of the following stages:

#### 1. GRADING:

After the wheat arrives in the mill it undergoes a cleaning process and the coarse impurities are removed. It is then stored according to its quality which is determined by the hardness, protein content and gluten quantity of wheat.

#### 2. CLEANING:

Cleaning begins with the screening to remove coarse and fine materials. The grains are then separated by size, shape, and weight. Cleaning of wheat grain involves series of equipments:

**Separator:** Reciprocating scrums removes stones, sticks and other coarse and fine material.

**Aspirator:** Air current removes the lighter impurities.

**Scourer:** Scour off impurities and roughage.

**Disc Separator:** Foreign materials are removed e.g., barley, cockle.

**Magnetic Separator:** Iron objects are removed.

**Washer:** Rotors circulate wheat and water in high speed. Removes stones and other heavy particles.

#### 3. CONDITIONING:

After washing conditioning takes place to produce a uniform moisture content in the grain. It helps to prevent breakup of the bran during milling and improves separation from endosperm. The main objective of conditioning is to maintain the moisture level of the bran. During conditioning the bran gets tough.



#### 4. GRISTING OR BLENDING:

After conditioning the different types of wheat's could be blended (gristed) to obtain flour of a particular specification. This is done to produce a mix capable of producing the required flour quality.

#### 5. MILLING:

After blending wheat passes through a set of break rolls. The set of break rolls have two rolls which have diagonal grooves and which move at different speeds in opposite direction from each other. After wheat passes through first set of break rolls, bran is separated and lifted off by air current. Large chunks off kernel are further directed to second set off break rolls. The product obtained is known as sooji, rava, or semolina from which flour is milled.

Refined semolina is passed through reduction rolls to obtain white flour at each stage of milling some quantity of flour is produced till finally semolina is milled. The flour is then bleached and matured either chemically or naturally by storing for 10-15 days. Flour in good condition should have a creamy white colour, pleasant smell and slightly sweetish taste.

#### Stone Mills

Stone milling is the simpler method of producing wheat flour. It is fairly of simple construction and comprises of heavy stones circular in shape one on top of the other. The bottom stone stays static and the other stone moves in a circular motion. The faces of stones are roughened so the grooves grip and cut the berries as the rough surfaces pass each other.

The wheat berries passes over a hole on the top stone and finds its way downwards between the stones. During this process the wheat grain is crushed into fine powder this is because of the friction created between the stones. Due to this friction the heat caused tends to melt the oil in germ. The oil present in germ becomes rancid quickly when mixed with the flour. Therefore, it is preferable to use stone milled flour within a week or so as the bread produced from it possess a very delicious flavor.

The characteristics of stone milled flour are as follows:

1. Less shelf life e.g., a week or two.

- 
2. Dark in colour.
  3. Tends to produce less volume breads and irregular in shape.
  4. Consists of tiny grounded stones.

### Exercise

#### Activity:-

- Q1) What do you understand by milling of wheat?
- Q2) What is break flour?
- Q3) Explain the process of milling in detail and also draw the flow chart?
- Q4) What is roller flour milling?



## Chapter-5 Flour

### 5.0 Unit Overview & Description

- ❖ Overview
- ❖ Knowledge and skill outcomes
- ❖ Resource Materials
- ❖ Duration
- ❖ Learning Outcomes
- ❖ Assessment Plan

5.1 Introduction to Wheat Flour

5.2 Composition of Wheat Flour

5.3 Types of Flour

5.4 Grades of Wheat Flour

5.5 Water Absorption Power

5.6 Gluten

### 5.0 UNIT OVERVIEW & DESCRIPTION:

#### Overview:

This unit will provide the students information about the composition of wheat flour. It will make them familiarize with the types & grades of flour. It will also provide them information about the water absorption power and gluten.

#### Knowledge and skill outcomes:

- i) Know the composition of wheat flour.
- ii) Know the types and grades of flour.
- iii) Understand the water absorption power and the role of gluten.

### Resource Materials:

- ❖ Gisslin, W. *Professional baking*. New York : John Wiley & Sons, c1985.
- ❖ Sultan, W. J. *Elementary baking*. New York: McGraw-Hill, c1969.
- ❖ Sultan, W.J. *Practical baking. 5th edition*. New York : Van Nostrand Reinhold, c1990

**Duration:** Total Hours 20

### Learning Outcomes:

5.1 Introduction to Wheat	General Overview
5.2 Composition of Wheat Flour	<ul style="list-style-type: none"><li>❖ Learn the composition of Wheat Flour</li><li>❖ Understand its Composition</li></ul>
5.3 Types of Flour	<ul style="list-style-type: none"><li>❖ Know the types of Flour</li><li>❖ Learn their Importance</li></ul>
5.4 Grades of Wheat Flour	<ul style="list-style-type: none"><li>❖ List down the grades of Wheat Flour</li></ul>
5.5 Water Absorption Power	<ul style="list-style-type: none"><li>❖ Learn the power of Water Absorption Power of Wheat</li></ul>
5.6 Gluten	<ul style="list-style-type: none"><li>❖ Understand the role of Gluten</li><li>❖ Learn its Importance</li></ul>

### Assessment Plan: (For the Teachers)

Unit-5	Topic	Assessment Method	Time Plan	Remarks
5.2	Composition of Wheat Flour	Exercise: Question & Answer		
5.3	Types of Flour	Exercise: Question & Answer		
5.4	Grades of Wheat Flour	Exercise: Question & Answer		
5.5	Water Absorption Power	Exercise: Question & Answer Group Discussion		
5.6	Gluten	Exercise: Question & Answer		



## 5.1 INTRODUCTION TO WHEAT FLOUR

WHEAT is the backbone of most yeast breads. A wheat berry (the actual seed that is clustered on the stalk) is an edible power package. Within just one wheat berry is the near perfect balance of nutrients that so efficiently sustained our ancestors. Upto 19 percent of the grain is protein and the rest being nutritionally valuable complex carbohydrates.



There are three main parts of the grain: The Bran, The Germ, and The Endosperm.

The bran is the thin shiny outer covering of the berry. It consists mainly of cellulose, an indigestible fiber that is good for our digestive system.

The wheat germ is the embryo of the berry. It is rich in protein and oil. Since this oil can turn rancid very easily it is important that the germ is refrigerated or for that matter any flour that contains the wheat germ such as whole-wheat flour.

The endosperm nourishes the berry and makes up the bulk of the grain. When the entire berry is ground, including the bran, the germ, and endosperm, the result is whole-wheat flour. When the bran and the wheat germ are removed the endosperm that remains is ground to make white flour.

Wheat has two growing seasons. The wheat that is planted in spring produces a hard red berry. Since this wheat has a long growing period it develops strength and is quite hearty. It is actually called hard red spring wheat even though it is harvested in early fall. The grain is very high in protein -from 12-14 percent.

Wheat planted in winter and harvested in spring produces a softer berry with a lower protein content-10-11 percent. This grain is called soft red winter wheat.

Whole-wheat berries are available in stores and are usually added into bread dough's to add extra protein, fiber and a strong wheaty flavour to the loaf as well as a substantially delicious chew to the crumb. They are usually softened by soaking overnight in water.

Cracked wheat is exactly what the name suggests: the whole berry coarsely cracked. It can be added into the dough or sprinkled on the crust. It gives the loaf a final rustic look, a



delectable habit forming chew, and an extra nutty flavour. (Don't get this mixed up with bulgur, which is cracked wheat that has been par cooked by steam, dried and packaged.)

As a food crop essential to the making of bread, pastry, and pasta, wheat products are eaten by many people at every meal. Wheat products are valued for their taste and for their nutritional benefit.

Wheat is one of the oldest cereal crops. It was cultivated as long as 9,000 years ago in the Euphrates Valley of the Middle East. Egyptian pharaohs were buried with an ancient variety of wheat to help nourish them on their voyage into the afterlife.

Wheat was also harvested by the ancient Greeks and Romans. It spread from its place of origin into Central Europe and into China, where it has been grown for perhaps 5,000 years. Wheat was brought to North America after the discovery of the New World, but corn remained the major crop of the early settlers. After winter-hardy varieties of wheat were brought to the Great Plains in the 1800s, acreage grew rapidly.

In 1990 more than 595 million metric tons of wheat were produced. The world's largest producer in that year was the Soviet Union, with an estimated annual yield of about 108 million metric tons. Other leading producers were China, the United States, India, Turkey, France, Canada, Germany, Australia, Pakistan, the United Kingdom, Argentina, and Poland. Wheat is a major crop throughout the United States, except in Alaska, Hawaii, and the New England states.

Wheat is easily handled and stored. The wheat berry is small and has high food value. Stored wheat is a highly concentrated form of food. Five bushels of wheat, when processed, will produce more than a barrel of flour. Wheat keeps so well that it can be shipped around the world or stored for years.

Wheat is called a grain. A grain is a member of the grass family Gramineae that yields a starchy seed suitable for food. Other grains are barley, corn, millet, oats, rice, and sorghum.

### **The Many Kinds of Wheat**

There are two basic types of wheat: winter and spring. Winter wheat is seeded in the fall, grows slowly during the winter months, accelerates in growth as spring arrives, and is ready for harvest in early summer. Where winters are harsh, spring wheat is planted in



the spring and harvested in late summer. It can also be sown in the fall where winters are very mild.

There are winter and spring varieties of both hard and soft wheat. Hard wheats are rich in gluten and make fine bread flour. Soft wheats are generally grown in areas with high levels of rainfall. They tend to be rich in starch and low in gluten. Soft wheats lack stickiness for bread making but are used in pastries and are often mixed with bread wheats. White wheat is usually soft winter wheat.

### **Classification**

More than 30 subspecies of wheat (*Triticum*) are known. Some are cultivated, and some still grow wild. A wheat species is classified according to the number and makeup of chromosomes and the structure of the head (spike or ear) of the plant. Chromosomes are the carriers of genetic information in the plant cell. The primitive and early cultivated wheats, such as einkorn (*T. monococcum*), had only 14 chromosomes. They are called diploids. Later types, such as durum (*T. durum*), emmer (*T. dicoccon*), and Polish wheats (*T. polonicum*), have 28 chromosomes and are called tetraploid wheat. The hexaploid wheats spelt (*T. spelta*), club (*T. compactum*), and most of the common bread wheats (*T. aestivum*) have 42 chromosomes. Most commercial wheats are either common wheat, used to make bread and flour, durum wheat, a hard wheat used for stock feed and to make pasta such as spaghetti and macaroni, or club wheat, a softer type, low in protein, used for pastry flour.

### **The Wheat Plant**

Wheat is an annual plant made up of roots, a stem, leaves, and the head, which is also called a SPIKE. The roots can grow about 3 to 6 feet (90 to 180 centimeters) deep. The hollow stem has about six segments joined by nodes, each with an attached leaf. Wheat leaves may be short and wide or narrow and long. They are made up of a sheath, which surrounds the stem, and the leaf blade, which lies out flat so it can gather light. Each leaf is on the opposite side of the stem from the leaf above or below it. Some wheat varieties grow only 2 to 3 feet (61 to 91 centimeters) tall, while others may grow 5 feet (152 centimeters) tall. The shorter varieties are a more suitable food crop.

The head or spike is the part of the plant where the grain forms. The head is usually made

The header features a collage of wheat-based products including bread, pastries, and rolls, set against a yellow and orange background with decorative swirls and circles.

up of a zigzag central axis along which are alternating spikelets each containing several flowers. The flowers are enclosed by protective structures called glumes. In some bearded varieties of wheat, the glumes have a long, slender bristle called an awn.

Fertilization begins about two days after the spike emerges from the sheath of the flag leaf. As the flowers open up, the anthers shed pollen that sticks to the stamen and germinates to grow into the ovary and fertilize the egg cell. Wheat is self-pollinating, which means that it is fertilized by its own pollen. The grain starts to grow after fertilization. The time needed for the grain to grow and mature depends on such factors as temperature and rainfall. In much of the United States, this takes about one month.

### **The Wheat Kernel**

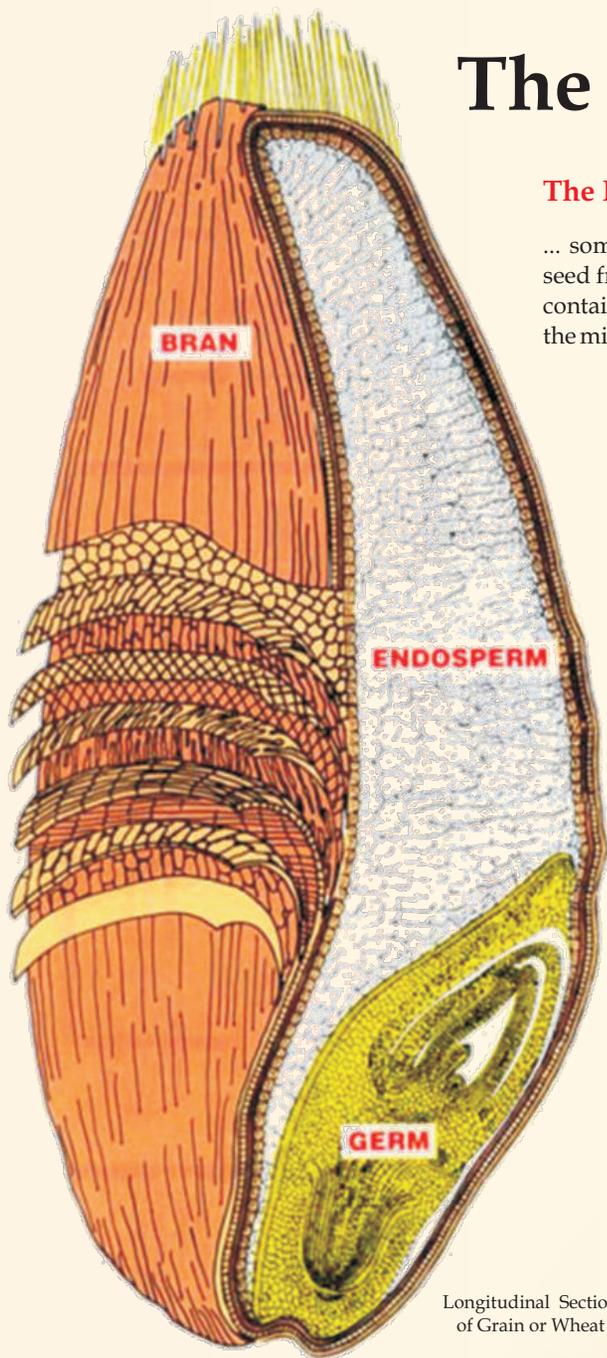
The wheat kernel consists of a tiny plant called the embryo, or germ, which makes up about 3 percent of the weight of the kernel, the starchy endosperm, and the protective seed coat, or bran. The endosperm makes up about 83 percent of the weight of the kernel and is the food supply for the seedling when a seed germinates. When wheat is milled into flour, the bran and germ are removed. Flour is produced by grinding or rolling the endosperm into powder.

Hard wheat used to make bread has 12 to 15 percent protein, while soft wheat has only 7 to 11 percent protein. This extra protein in hard wheat makes bread dough sticky, so that it rises better during baking. The rest of the wheat kernel is 2 percent fat, 2 percent mineral, 65 to 70 percent carbohydrate, 3 percent fiber, and 13 percent water. Wheat grain also contains some vitamin E and several B vitamins, especially niacin. Since the bran contains more protein and vitamins than does the starchy endosperm, whole wheat flour is more nutritious than white flour. In addition to being one of the oldest grains grown, wheat is the world's most widely grown cereal. It is believed to have been milled into meal 9,000 years ago. In modern times wheat is used to produce meal, breakfast cereals, and flour for bakery products. It can be cultivated in a wide range of soils but thrives in temperate climates. There are essentially two kinds of wheat. Hard wheat is grown mainly in the United States and Canada, and soft wheat is raised mainly in Europe and Australia. The hard wheat is better for bread making, the soft wheat for cakes and biscuits. There are also differences between the varieties of wheat planted in the spring and those in winter. Spring wheats grow quickly and are harvested in late spring or early



summer, whereas winter wheats are planted in late autumn and are not harvested until spring or early summer wheats grow quickly and are harvested in late spring or early summer, whereas winter wheats are planted in late autumn and are not harvested until spring or early summer.

## The Kernel of Wheat



### The Kernel of Wheat

... sometimes called the wheat berry, the kernel is the seed from which the wheat plant grows. Each tiny seed contains three distinct parts that are separated during the milling process to produce flour.

### Endosperm

... about 83 percent of the kernel weight and the source of white flour. The endosperm contains the greatest share of protein, carbohydrates and iron, as well as the major B-vitamins, such as riboflavin, niacin and thiamine. It is also a source of soluble fiber.

### Bran

... about 14 percent of the kernel weight. Bran is included in whole wheat flour and can also be bought separately. The bran contains a small amount of protein, large quantities of the three major B-vitamins, trace minerals and dietary fiber - primarily insoluble.

### Germ

... about 2 percent of the kernel weight. The germ is the embryo or sprouting section of the seed, often separated from flour in milling because the fat content (10 percent) limits flour's shelf-life. The germ contains minimal quantities of high quality protein and a greater share of B-complex vitamins and trace minerals. Wheat germ can be purchased separately and is part of whole wheat flour.

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Longitudinal Section  
of Grain or Wheat



## 5.2 COMPOSITION OF WHEAT FLOUR

Refined flour is a hard wheat flour with about 12 percent protein. It is used for yeast raised bread because the dough it produces has more gluten than dough made with other flours. Sufficient gluten produces a light loaf with good volume. Slices hold together, rather than crumble. Wheat flour contains the nutritious germ and bran as well as the endosperm of the wheat kernel. Bran particles cut through the gluten during mixing and kneading of bread dough, resulting in a smaller, heavier loaf.

Composition of flour will be depending upon the types of wheat used in grist. A typical analysis is given below:

Starch	71.5 to 74.5%
Moisture	13.5 to 14.0%
Protein (gluten forming)	7.0 to 10.0%
Protein (soluble)	1.0%
Sugar	2.0%
Fat	1.0%
Ash (mineral salts)	0.5%

### Starch

Starch consists of microscopic granules or cells. Although starch is not soluble in water, it absorbs moisture through its cells and hence the necessity of protecting flour from too humid atmosphere.

When starch is heated about 140 deg F. with about six times of its weight of water, starch cell swells and cell bursts. Starch becomes soluble in water and in concentrated form will form a gel.

This process is known as gelatinization. This quality of starch is made use of in making fruit pies where fruits are kept in suspension in starch gel, degree of gelatinization influences the water holding capacity of starch cells. Completely gelatinized starch will hold more water for long time than partially gelatinized starch. For complete gelatinization of starch, there should be sufficient water available and it should be heated to 140 deg F.



During the cooling process starch cells give away some of its water, which is partially held by gluten framework and partially evaporated. When such bread is heated, starch cells again absorb available water and become swollen. This is why a state bread becomes softer when heated.

During the process of milling about 6% of starch cells are crushed and damaged due to impact of rolls. Such starch is also known as soluble starch. The enzyme Beta-amylase present in the flour acts on soluble starch and converts it to maltose sugar. Enzymes also get activated with the rise in temperature and convert more starch into maltose sugar. Thus the need of yeast for more food is fulfilled and due to increased gas production, bread acquires desired volume. However, the presence of excessive damaged starch cells will cause production of undesirable amounts of maltose sugar, only a part of which will be needed by yeast.

Alpha amylase is another enzyme of amylolytic group which is found in flour. This enzyme partly breaks down the sound starch cells to form dextrins which, in limited amount, give sheen to bread, improving its eye appeal.

This activity of alpha and beta amylase is known as diastatic activity. When flour lacks in diastatic action, it can be supplemented by using diastatic malt in the formula. If flour has excessive diastatic activity as in this case of flours made from sprouted wheat it may be useful to take the following precautions in order to reduce to some extent the harmful effects of excessive diastatic activity.

1. Use plenty of yeast for vigorous fermentation of dough.
2. Keep the doughs cool as high temperatures will promote the amylase activity.
3. Use emulsifiers liberally to prevent stickiness in the crumb.
4. Keep strict control on fermentation and prevent the doughs from becoming acidic.
5. Bake the bread thoroughly so that it has even golden brown colour all around.
6. Slice the bread when it is thoroughly cooled.

### **Moisture**

The next important constituent of flour is moisture. A level of 13-14% moisture content in flour is ideal from bakers point of view. If moisture in flour is higher, the baker will be



getting less solid material and more of water for his money. Higher moisture will warm up the flour during storage and will induce insect infestation, reducing its storage life. If the moisture content of flour high, it will reduce the water absorption power of the flour, resulting in less yield.

### **Protein**

Maida contains soluble and insoluble proteins. Soluble proteins are useful in providing nourishment to yeast for its growth and reproduction during fermentation process. Two insoluble proteins gliadin and glutenin form a rubbery material when water is added to flour and it is mixed. This rubbery material is known as "gluten" and is responsible for formation of structure of baked products. High structured products like bread will require stronger quality of gluten while lower structured products like cakes, cookies do not require strong gluten.

Glutenin gives strength to the dough in order to enable it to hold gases during baking operation and gliadin gives elastic or stretching properties to dough. The quantity and quality of these two proteins present in the flour determine the quality of the flour which is termed as strong, weak or medium. These terms should not be confused with hard or soft because these terms specify the type of wheat from which the flour is milled.

It does not require any elaborate equipment to estimate the quantity of gluten. Just an accurate weighing scale, a small bowl, a plastic spatula or a spoon, a small measuring cylinder and a wire sieve.

### **Ash Content**

Ash content of flour is indicative of the degree of its purity with respect to bran fragments. Higher ash content means that the flour contains too much of bran fragments. Apart from darkening the colour of flour, the bran fragments can also have a cutting action on gluten fibres. Such flour will not retain gas during different stages of processing and the product thus made will have a low volume and poor texture. The protease enzyme present in the "Aleuron Cells" will also weaken the flour.

On a small glass plate place a small heap of flour and with another similar glass plate press the flour to smoothen the upper surface. Gently cut out rough sides, and form a neat wedge. Now dip this wedge gently in slanting position in a bowl of water so that the



surface of flour is moistened. Now observe the moistened surface minutely. Colour of bran fragments will be more pronounced in wet condition.

### Sugar

Small quantity of sugar which is naturally found in flour is of sucrose or maltose type. Even if sugar is not added to bread formula, it should be possible to make bread as the sugar naturally occurring in flour will provide sufficient food to yeast to produce carbon dioxide gas. Apart from providing food for yeast, sugar has other functions to perform i.e. retaining moisture in bread, imparting golden brown colour to crust, improving taste and flavor of bread etc. these beneficial effects cannot be achieved with the limited amount of sugar naturally occurring in flour. Hence, the necessity for using additional sugar in bread formula.

### Exercise

#### Activity:-

1. Write the components of flour along with their percentages?
2. Define the following?
  - a) Gelatinisation
  - b) Gluten

### 5.3 TYPES OF FLOUR

**Wheat flour** is consumed in larger quantities worldwide than any other cereal flour. This is because of its extensive availability wheat can be grown under widely varying climatic conditions and to its almost universal acceptance as a staple food item (see Wheat). Wheat flour contains a unique protein called gluten. When wheat flour is mixed with water, the gluten forms an elastic dough. When the dough is baked in a hot oven, it expands to several times its original volume. Flours made from soft wheats containing less than 12 percent of gluten protein are used to make





tender products such as cakes and crackers. Flours made from hard wheats containing more than 12 percent protein are used for bread and roll production. The miller can supply the baker with a wide range of wheat flour types, each custom milled to the baker's specifications

**Rye flour** contains a small amount of gluten protein and may be used by itself to produce dark rye breads. It is often blended with wheat flour to produce finer textured, light rye breads. The distinctive flavor of rye flour makes it a common inclusion in such items as snack foods and prepackaged toast.

Rye has always been grown amid wheat, being a more heartier and insistent plant-like a weed. At one time the European farmers tried to remove it from cultivated wheat crops but they had to give up, because the rye persisted growing at a faster rate than they could remove it. So they simply started harvesting it with the wheat, and started calling it rye flour. Nowadays rye is grown separately and one can get 100 percent rye without the adulterating wheat.

Rye contains very little gluten so rye breads are often created by a high proportion of gluten strong wheat flour to assure a well-risen loaf. Breads that are completely rye will not rise much, but they will have a real hearty intriguing flavour. Be warned that dough's with rye flour behaves differently from wheat dough's; it will be very tacky and will rise at leisured not more flour if these dough's appear sticky, or you will get a heavy, sodden loaf.

Rye berries are dark brown whole grains. Although each grain delivers about 7 percent protein but virtually no gluten, the fragrant benefit of adding rye to breads is remarkable. One can even add the soaked softened whole grain and the cracked rye berries to breads for extra nutrition, distinct toasted aroma, and subtle bite in flavour.



Some mills grind the whole rye berry, bran and all into a very coarse meal, which is often called pumpnickel rye flour. (Pumpnickel bread does not come from the pumpnickel grain. The name derives from a German, Herr Pumpnickel, who popularized this dark, hearty bread many years ago.)



**Corn flour** and **Corn meal** are used in the production of crusty corn breads and muffins. Corn has no gluten but does have a distinctive flavor and a pleasant yellow color that is desirable in many products.

**CORN** is native to the Americas. According to the archeologists the Aztecs grew sacred forests of these yellow grain. The kernel just like the wheat berry is full of complex carbohydrates. Cornmeal comes in a variety of different colours. Mostly one finds the yellow cornmeal, though one even gets the white variety as well as the blue cornmeal. The yellow and the blue are the most flavourful, but you may have to add a little more fat to the blue variety. Cornmeal adds a rich sweet taste to the crumb and gives a rugged look to the crust.



Corn flour



Corn meal

**Oat flour** and **Oat meal** are used primarily in breakfast foods and granola-type products. Oat flour is the most nutritionally complete of all flours. Oats the grain is called Groat, and it is packed with B vitamins, vitamin E, minerals, and iron, a great deal of soluble fiber and a fair amount of fiber. One can use the familiar rolled oats, which is often cooked into oatmeal, on top of some bread for the classic country appearance.





**Barley flour** can be found in baby foods and malted milks. In some countries large quantities of barley flour are used for bread making.

**Sorghum and millet flours** are popular in India, Central America, and Ethiopia. They are utilized in the making of flat bread, tortillas, and pancakes.

**Rice** has long been the staple food of Asia. It is normally eaten as a whole grain, so rice mills remove either the hull to produce brown rice or both the hull and the bran coat for the production of white rice. A small percentage of rice is converted to flour and is used in baby foods and sauces.



**Buck wheat** is not a true cereal grain, but buckwheat flour



provides a distinctively flavored pancake and breakfast food ingredient. Buck wheat is actually a grass like herb, related to sorrel, and has a slightly sour flavour. Buckwheat flour has an attractive tan colour speckled with dark brown. Substitute not more than 20 percent of buckwheat for regular wheat in the recipe. If you add more the taste will be too overpowering and too strong.

**Whole Wheat Flours** are made from 100 percent whole-wheat berries creating a heady light brown flour. The flour feels gritty when rubbed between your fingers, and the bran is visible in flecks. During fermentation these bran flecks help the dough rise as they trap the carbon dioxide.



**Bleached and Unbleached Flour:** Unbleached flour is ground wheat flour with the bran sifted out, but with all the germ remaining. As the sifted flour is stored and aged it naturally starts bleaching and lightens in colour. It was found that the aged bleached flour was easier to manipulate into the dough's, so commercial bakeries began to demand the whitened flour. To accommodate this need without the lengthy aging period, chemical methods of bleaching were developed.

**Semolina Flour** is granular flour made from Durum, which is a variety of hard wheat, with the bran and germ removed. The term Semolina refers to the texture, which is



similar to finely ground cornmeal. Many believe that semolina flour makes the best pasta. Semolina Flour is used in making pasta and Italian puddings. It is made from durum wheat, the hardest type of wheat grown. The flour is highest in gluten. When other grains, such as rice or corn, are similarly ground, they are referred to as "Semolina" with the grain's name added, i.e., "Corn Semolina" or "Rice Semolina." There are difference grades:

- 1) Semolina flour is finely ground endosperm of durum wheat.
- 2) Semolina meal is a coarsely ground cereal like farina.
- 3) Wheatena is ground whole-grain wheat.
- 4) Durum flour is finely ground semolina and is grown almost exclusively in North Dakota.

**Organic Flours** are flours that are grown in fields that are fertilized by naturally occurring substances-composted materials, aged animal manure, and green manure. The soil as a result becomes more loose and this allows the roots to grow deeper, and the plant structure is strong. When the grain is harvested and cleaned it is stored without the use of fumigants or synthetic agents. The result is a full bodied wholesome taste, like a tomato or a carrot grown in your own garden.

Commercial fields are on the other hand treated with pesticides, to fight bugs, herbicides to combat weeds, fungicides to combat fungi and other synthetic fertilizers. The young crop is sprayed repeatedly during the growing season and sprayed again after it is harvested and stored. The flour is rather flat tasting and characterless in flavour.

### **Food Value**

Foods containing cereal flours have contributed to human nutritional needs for thousands of years. In the United States they contribute up to 28 percent of the energy, 18 percent of the proteins, and 46 percent of the carbohydrates in the average diet. In some European and North African nations, they provide as much as 75 percent of the energy and 90 percent of the proteins in the average diet.

In the United States wheat flour, corn meal, and macaroni are enriched with vitamin B1, vitamin B2, niacin, and iron. Vitamin D and calcium are added to flours for use in areas where flour is a primary nutritional source. Cereal flours are generally low in fats.

## Exercise

### Activity:-

- Q1) Visit a nearby flour mill and identify the products and categorize them.
- Q2) List the different types of flour.

## 5.4 GRADES OF WHEAT FLOUR

**Bleached and Unbleached flour:** Flour that is bleached naturally as it ages is labeled "unbleached," while chemically treated flour is labeled "bleached." Bleached flour has less protein than unbleached. Bleached is best for pie crusts, cookies, quick breads, pancakes and waffles. Use unbleached flour for yeast breads, Danish pastry, puff pastry, strudel, Yorkshire pudding, eclairs, cream puffs and popovers.



**Bread Flour** is white flour made from hard, high-protein wheat. It has more gluten strength and protein content than all-purpose flour. It is unbleached and sometimes conditioned with ascorbic acid, which increases volume and creates better texture. Bread flour has 12% to 14% protein (gluten). This is the best choice for yeast products.

**Cake Flour** is a fine-textured, soft-wheat flour with a high starch content. It has the lowest protein content of any wheat flour, 8% to 10% protein (gluten). It is chlorinated (a bleaching process which leaves the flour slightly acidic, sets a cake faster and distributes fat more evenly through the batter to improve texture. When you're making baked goods with a high ratio of sugar to flour, this flour will be better able to hold its rise and will be less liable to collapse. This flour is excellent for baking fine-textured cakes with greater volume and is used in some quick breads, muffins and cookies. If you cannot find cake flour, substitute bleached all-purpose flour, but subtract 2 tablespoons of flour for each cup used in the recipe (if using volume measuring).

**Pastry Flour** also is made with soft wheat and falls somewhere between all-purpose and cake flour in terms of protein content and baking properties. Pastry flour (also known as cookie flour) has a protein (gluten) of 9% to 10%. Use pastry flour for making biscuits,



pie crusts, brownies, cookies and quick breads. Pastry flour makes a tender but crumbly pastry. Do not use it for yeast breads. Pastry flour (both whole-wheat and regular) is not readily available at supermarkets, but you can find it at specialty stores and online. You can try to mimic it by using a 2-to-1 ratio of all-purpose flour to cake flour.

### Exercise

#### Fill in the blanks:

1. The percentage of gluten in bread flour is \_\_\_\_\_.
2. The percentage of gluten in cake flour is \_\_\_\_\_.
3. The percentage of gluten in pastry flour \_\_\_\_\_.

## 5.5 WATER ABSORPTION POWER

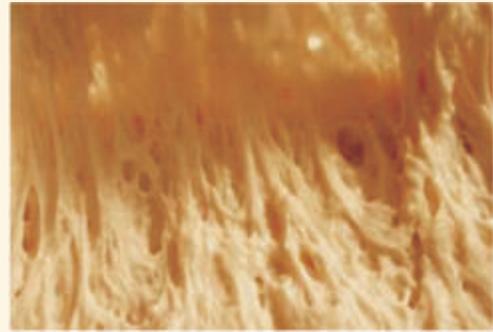
The most important characteristic of flour is its protein content, because the protein content determines how much gluten can be developed. The protein content depends primarily on the type of wheat used and its growing conditions. To make high protein flour, you must start with high protein wheat.

The milling process affects the protein content of a grade flour. Remember that the outer portion of the endosperm is higher in protein than the inner portion. Thus, a flour made from just the inner portion of a high protein grain will still be a high protein flour, but it will be lower in protein than a flour made from the entire endosperm or from just the outer portions. The protein content of flours available to professional bakers is always indicated. It may range from about 8% for cake flours to 12% to 13% for bread flour to 14% and up for high gluten flour.

Absorption refers to the amount of water a flour can take up and hold dough consistency or stiffness. It is expressed as a percentage of the weight of flour. Thus, if the absorption ratio of a certain grade of flour is described as 60%, this means 60 lb water combined with 100 lb flour would yield a dough of standard consistency. The absorption ratio of water is a function of the protein content. The higher the protein content of the flour, the more water it can absorb. This is an important consideration for the baker. She will have to adjust the water in her bread formulas if she starts using flour of a different protein content.

## 5.6 GLUTEN

While the endosperm contains mainly starch, it also contains the proteins glutenin and gliadin. When these two proteins are moistened they form together a super protein called GLUTEN. Gluten provides the muscle for a yeast dough, a highly valued baking quality. When the dough is kneaded the gluten develops, forming thin flexible web like strands in the dough. The muscular strands stretch and expand, trapping carbon dioxide as the dough rises during fermentation.



Dough's with well developed webs of gluten, will rise well , producing high expansive breads with good flavour. Wheat is the only grain which provides this proportion of gluten, therefore it is an essential ingredient in making traditional bread.

### Exercise

- Q1) What is gluten?
- Q2) Discuss the role of gluten in dough?



## Chapter-6

### Role of Raw Materials used for Bread Making

#### 6.0 Unit Overview & Description

- ❖ Overview
- ❖ Knowledge and skill outcomes
- ❖ Resource Materials
- ❖ Duration
- ❖ Learning Outcomes
- ❖ Assessment Plan

6.1 Introduction to Role of Raw materials used for Bread Making

6.2 Essential: Flour, Salt, Yeast, Water, Sugar

6.3 Optional: Fats and Oils, Eggs, Bread Improvers, Milk

#### 6.0 UNIT OVERVIEW & DESCRIPTION

##### Overview:

This unit will help the students to know about the various raw materials used in bread making. It will help them to learn the roles of each of them. It will help to classify the various essential and optional ingredients used in bread making.

##### Knowledge and skill outcomes:

- i) Know the various ingredients used in bread making.
- ii) Learn the essential ingredients such as flour, salt etc.
- iii) Learn the optional ingredients used in bread making.

##### Resource Materials:

- ❖ Gisslin, W. *Professional baking*. New York : John Wiley & Sons, c1985.

- ❖ Sultan, W. J. *Elementary baking*. New York: McGraw-Hill, c1969.
- ❖ Sultan, W. J. *Practical baking. 5th edition*. New York : Van Nostrand Reinhold, c1990

**Duration:** Total Hours 20

**Learning Outcomes:**

6.1 Introduction to Role of Raw Materials used for Bread Making	General Overview
6.2 Essential: Flour, Salt, Yeast, Water, Sugar	<ul style="list-style-type: none"> <li>❖ List all the essential ingredients for Bread Making</li> <li>❖ Understand their role in Bread Making</li> </ul>
6.3 Optional: Fats and Oils, Eggs, Bread Improvers, Milk	<ul style="list-style-type: none"> <li>❖ List all the optional ingredients used Bread Making</li> <li>❖ Understand the role of each of the Ingredient</li> </ul>

**Assessment Plan: (For the Teachers)**

Unit-6	Topic	Assessment Method	Time Plan	Remarks
6.2	Essential: Flour, Salt, Yeast, Water, Sugar	Exercise: Question & Answer		
6.3	Optional: Fats and Oils, Eggs, Bread Improvers, Milk	Exercise: Question & Answer		

**6.1 INTRODUCTION TO ROLE OF RAW MATERIALS USED FOR BREAD MAKING**

**The Ingredients of Bread**

All bread is made by baking a dough that has two basic ingredients, flour or meal and a liquid. Bakers can use a wide variety of both components.

The most common type of flour used for bread and most other baked goods is made from



wheat. Wheat flour has a pleasant taste and contains a large amount of an elastic protein substance called gluten. Gluten aids in baking uniformly light bread that rises (swells) properly. Other baking flours are made from barley, rye, corn, rice, oats, soybeans, and potatoes. These flours, particularly soybean flour, may equal wheat nutritionally, but none can match wheat for creating light, even-textured bread. Hard wheat flour makes a lighter bread than does soft wheat flour because it is richer in gluten. Rye and whole-wheat breads are made lighter by adding white flour. The liquids used in baking include water, sweet or sour milk, yogurt, wine, and beer.

Bread is either leavened or unleavened. Leavened breads contain some substance that produces bubbles of carbon-dioxide gas. These gas bubbles inflate the dough, causing it to rise and become light and porous. Most kinds of basic breads are leavened with a fungus called yeast. Biscuits, muffins, and cakes and other pastries are leavened with either baking powder or baking soda.

Unleavened bread is dry and hard. Familiar kinds of unleavened breads include water crackers, the rye crisp of Sweden, and Jewish matzoth.

Whether leavened or unleavened, most breads contain other ingredients in addition to flour and a liquid. An almost limitless variety of breads can be made by adding a sweetener, shortening, cheese, eggs, meat, fruit, vegetables, seeds, or nuts.

A sweetener, either sugar or syrup, is used in almost all bread for its taste or as an aid to yeast growth. Bread may also have an external sweetener in the form of a decorative glaze.

The high fat content of shortening and cheese increase tenderness and flakiness in bread. Perhaps the best example is the French croissant.

Eggs help leaven bread dough by adding to the bread's lightness. They can be brushed on top of the dough before baking to create a shiny crust, as in the Jewish hallah.

Some breads from many nations contain fruit, a vegetable, meat, seeds, or nuts. Examples include the fruit scone of Great Britain, the spinach paratha of India, the Southern sausage bread of the United States, the Easter sesame bread of Greece, and the almond sweet bread of Finland.

## 6.2 ESSENTIAL: FLOUR, YEAST, WATER, SALT, SUGAR

### Flour

The flour is the main ingredient used in bread making. Strong flour is recommended for bread making and it should have a creamy white colour, it should feel slightly coarse when rubbed between the fingers. The protein content of the flour should be high. Flour provides the structure to bread. Flour contains proteins that interact with each other when mixed with water, forming gluten. It is, this elastic gluten framework which stretches to contain the expanding leavening gases during rising. The protein content of a flour affects the strength of a dough. The different wheat flour types contain varying amounts of the gluten forming proteins. In yeast breads, a strong gluten framework is desirable.



### Yeast

After flour, yeast is next important ingredient for bread making. In olden days most of the bakers used barn method of bread making in which wild yeast was cultured. It was necessary to use prolonged fermentation. Due to this bread had that peculiar fermentation flavour which is still remembered by people nostalgically. However times have changed ,bakers yeast is easily available and bakers botherations about uncertainties of fermentation have been eliminated. For practicing bakers, it is necessary to understand the functioning of yeast , so that he is in a better position to control yeast activity in doughs and thus controls the quality of bread and other fermented products.

Bread doughs are fermented basically for two reasons i.e:

1. Production of carbon dioxide gas which gives volume to the product.
2. For maturing or conditioning the dough (gluten) so that it attains sufficient mellowness to stretch under the pressure of carbon dioxide gas and form the structure of the product.

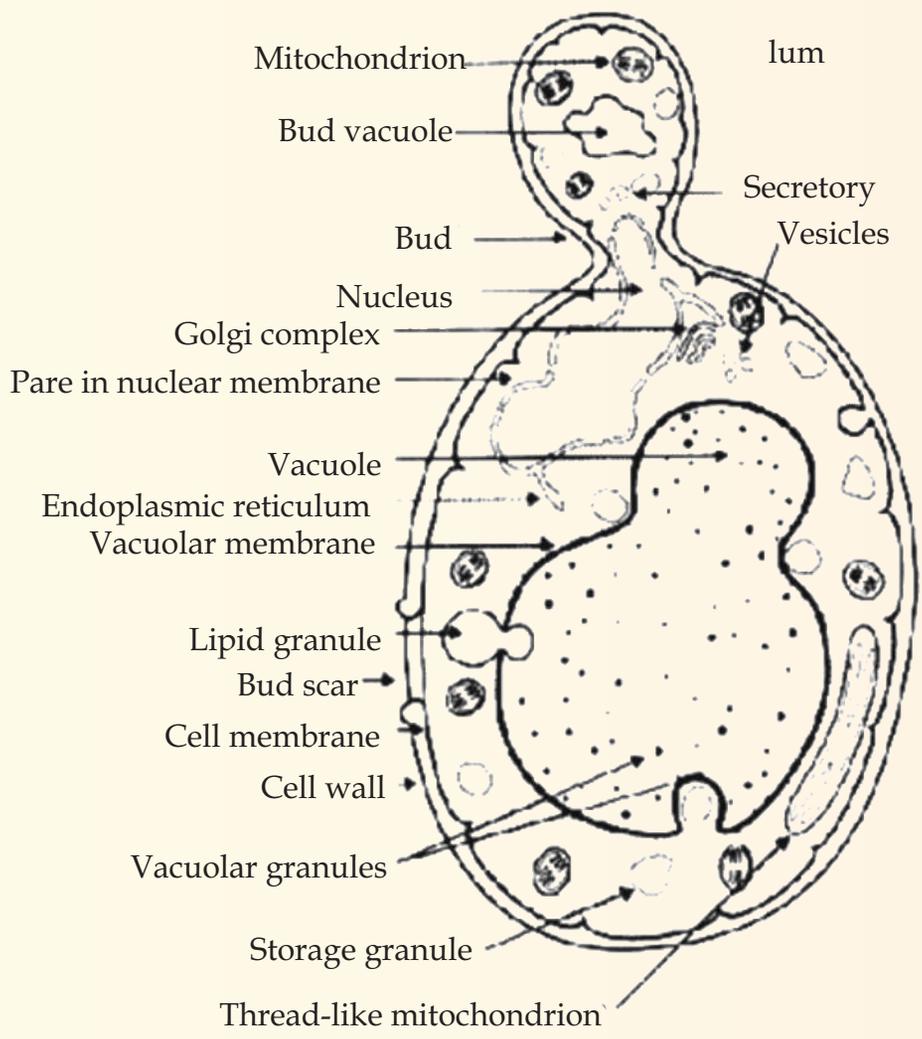


These functions are performed by yeast. Let's see how?

Yeast is a unicellular microscopic plant. Its structure consists of a cell wall, protoplasm, and vacuole. It requires food, moisture and temperature for its growth and reproduction. Yeast multiplies by budding. When a yeast cell is placed in a liquid medium at optimum temperature containing simple sugar, then the cells start growing buds on its cell wall which keeps on growing until daughter cells acquire the same size as the mother cell and start producing other buds. Yeast is a living microorganism until it is destroyed by heat. The protoplasm of yeast contains certain enzymes like Invertase, Maltase, zymase and protease by which fermentation activity of yeast is made possible. Hence enzymes are known as catalytic agents.

There is no other organism which contains the same combination of enzymes in the same proportion. That is why there is no substitute for yeast as a fermenting agent. Average analysis of yeast is as follows:

Proteins	14.00%
Carbohydrates	10.20%
Fats	0.46%
Minerals	2.34%
Moisture	73.00%
Enzymes	Present
Vitamins	Present



**Yeast is available in 3 forms:**

1. Fresh yeast / Compressed / wet yeast is moist and perishable.
2. Active dry yeast is a dry granular form of yeast. It has to be activated before use, i.e. it has to be rehydrated in 4 times water its weight of warm water before use.
3. Instant dry yeast is also a dry granular form of yeast, but it does not have to be dissolved in water before use. It can be added in its dry form because it absorbs water much more quickly than regular dry yeast. Compressed yeast should be used 2-2.5 times more as compared to dry yeast.





## Water

Water binds together the insoluble Proteins of flour, which form gluten. Any water which is fit to drink can be used for bread making. However; it should be remembered that water, being a very good solvent, is rarely found in nature without any minerals dissolved in it. Hard water contains more minerals than soft water. These minerals in limited quantities, have a beneficial effect on gas production as the yeast requires minerals for vigorous fermentation. The gas retention of the dough is also improved as minerals have a tightening action on gluten. For this reason precisely, very hard water should not be used for bread making. With very hard water, it may be necessary to increase the quantity of yeast and reduce salt to appropriate level. Lactic acid could be used which will have a mellowing effect on gluten. The quantity of lactic acid should be carefully regulated because it has a very pungent odour which may interfere with the pleasant flavour of bread. Very soft water is also not desirable as it is not conducive either to good gas production of gas retention and in such cases it may be necessary to increase the content of mineral yeast food (MYF). Medium hard water (Hardness about 17ppm) is considered to be most suitable for bread making.

## Salt

Salt imparts taste to bread. It is also one of the most important constituent to bring out the flavour in bread. It has a controlling effect on yeast activity and thus keeps the fermentation speed under check. As the salt has tightening action on flour proteins, it improves the gas retention power of the dough. Being hygroscopic substance, it helps to keep the bread fresh and moist for longer time. The colour of crust is largely dependent on the amount of sugar present in bread at the time of baking, and this amount of sugar will depend on the speed of yeast activity, which, in turns, is controlled by salt. Therefore, if there is less salt in formula, yeast action will be more than normal and there will be less sugar left for caramelization resulting in poor crust colour. Conversely, more salt in formula will produce a bread with harsh red crust colour, as there will be





more sugar left at the time of baking due to check on yeast activity. The quantity of salt in bread formula will vary between 1.25 to 2.5% depending on the strength of flour, length of fermentation time, hardness of formula water, the level of flavour desired in the product and the constitution of MYF. In sweet fermented products, the salt content generally varies from 1.0 to 1.5%. If salt is omitted or reduced, other spices or flavorings in the recipe should be increased slightly. In yeast dough, salt slows yeast fermentation. Omitting or reducing the amount of salt in yeast dough can cause the dough to rise too quickly, adversely affecting the shape and flavour of bread.

### Sugar

The main function of sugar in bread making is to provide for yeast which in turn produces carbon dioxide gas, that raises the dough fabric. It also helps in enhancing the flavor of bread. Being hygroscopic substance, sugar helps to retain moisture in bread. It contributes to the golden brown outer crust colour of bread. Apart from the sugar added in the formula, there is also another source of sugar in fermenting dough and that is by the activity of diastase enzyme on starch. The capacity of flour to produce sugar from starch is known as diastatic capacity and is carried out by a group of enzymes known as diastase which are contained in flour. Diastase enzyme converts starch into maltose sugar and dextrans. Maltose is broken down by another enzyme maltase into dextrose (glucose) which provides food for yeast at the critical time of final stage of fermentation i.e during initial stage of baking. It also imparts bloom to the bread.



At times, flour may be deficient in diastatic activity and bread may not get oven spring. To correct such condition one of the remedies may be tried.

1. Make a small quantity overnight sponge and added to the dough. This will reduce the pH of the dough.
2. Use diastase malt at the rate of 0.225%.
3. Blend with flour having good diastatic activity.



### Exercise

- Q1) List the essential ingredients in bread making?
- Q2) Discuss the role of yeast in bread making?
- Q3) Discuss the action of the following?
- a) Water
  - b) Sugar
  - c) Salt
  - d) Flour

### 6.3 OPTIONAL: FATS AND OILS, EGGS, BREAD IMPROVERS, MILK

#### Fats and Oils

Fat is used in bread doughs at the rate of 1 to 2%. To that extent it improves the nutritional value of bread. In small quantities it has a lubricating effect on gluten strands, thus improving their extensibility which enables the bread to acquire good volume. In larger quantities (more than 6%) fat exerts a dead weight on fine web like structure, thus hampering the volume of bread. Fat also helps in retention of moisture in bread and improves its slice ability. Fat should be added during the last stages of mixing. If it is added in the beginning, it will have an



adverse effect on water absorption power of the flour. Fats can be used in the form of solid shortening, margarine, or butter; or in the liquid form of oil contributes tenderness, moistness, and a smooth mouth feel to the bread. Fats enhance the flavors of other ingredients as well as contributing its own flavor, as in the case of butter. In baked goods such as muffins, reducing the amount of fat in a recipe results in a tougher product because gluten develops more freely. Another tenderizing agent such as sugar can be added or increased to tenderize in place of the fat. A small amount of fat in a yeast dough helps the gluten to stretch, yielding a loaf with greater volume.



## Eggs

Eggs serve many functions in bread making. They add flavor and colour to it. Egg contains proteins, fat and lecithin which helps in keeping the bread moist and soft due to their modifying action on gluten. Protein of egg has strengthening action on flour proteins which improves volume and crumb structure of bread. As an improver egg can be used at the rate of 4 to 6% based on flour. Under the action of heat, egg white coagulates faster than egg yolk and beneficial components like fat, lecithin are found in egg yolk only. Hence it is advisable to use only egg yolk in fermented goods. However, egg as an improver in bread should be used with caution as it may be acceptable to majority of bread consumers.



## Bread Improvers

If the quality of raw material is good and the baker knows his job well, it is hardly necessary to use any bread improvers. However, ideal conditions for bread production do not always exist. Quality of flour varies from consignment to consignment, mineral content of water varies from place to place and with the complete mechanization of bread production process, it has become unavoidable to make use of certain chemicals in order to ensure consistently good quality of the product. Flours, always do not contain desirable quality gluten forming proteins. Any added material which can improve the strength and extensibility of gluten of flour is known as Bread improver.

**Potassium Bromate** is one of the earliest known chemical used by baking industry to improve the quality of bread. It oxidises the the gluten, giving it more strength, which has direct bearing on oven spring and other related characteristics of bread. After reaction is complete potassium bromide remains as end product which is considered to be harmless substance. The quantity of potassium bromate to be used ranges from 10 to 40 ppm (parts per million), depending on the strength of maida, formulation of the product and process used.

For convenience, a definite quantity of potassium bromate can be dissolved in measured



quantity of water and the solution can be used to provide potassium bromate at desired level. For example:

Potassium bromate	10 g
Water	1000 ml

If 100 ml of this solution is used in 100 kg maida, the quantity of potassium bromate will be 1 g which will amount to 10 ppm Potassium bromate can also be diluted with maida in desired proportion as given below:

Potassium bromate	10 g
Maida	4990 g
Improved Flour	5000 g

500 g of this flour per 100 kg of formula flour will provide potassium bromate at the level of 10 ppm.

### **Milk**

Milk has tightening action on flour proteins which eventually improves the texture of bread. Inclusion of milk in the formula necessitates addition of extra 2 to 3% water in the dough thereby increasing the yield by that amount. Milk improves the flavour and taste of bread and lactose content of milk improves the crust colour. In regular white bread 1 to 2% milk(solids) can be added for improving the quality of bread which will also subscribe to its nutritional content.



However, to qualify as milk bread, it should have higher amounts of milk solids content. Milk can be used for bread making in any form i.e. fresh liquid, evaporated, condensed or powder form. Skimmed milk is preferred because due to absence of fat it has better shelf life and it is less expensive than whole milk powder.



### Exercise

Q1) Discuss the role of optional ingredients used in bread making?

Q2) List the different roles of egg in bread making?

Q3) Name the following

- a) It helps in retention of moisture in bread and improves its slice ability.
  - b) It is an added material which can improve the strength and extensibility of gluten of flour.
  - c) It has tightening action on flour proteins.
- 



# Chapter-7

## Methods of Bread Making

### 7.0 Unit Overview & Description

- ❖ Overview
- ❖ Knowledge and skill outcomes
- ❖ Resource Materials
- ❖ Duration
- ❖ Learning Outcomes
- ❖ Assessment Plan

7.1 Introduction to Methods of Bread Making

7.2 Straight Dough Method

7.3 Sponge and Dough Method

### 7.0 UNIT OVERVIEW & DESCRIPTION

#### Overview:

This unit will provide information to the students about the dough making methods for bread making. It will help them to understand the straight dough method with salt delayed method and no time dough method. It will also help them to understand the sponge and dough method.

#### Knowledge and skill outcomes:

- Understand the straight dough method.
- Understand the sponge and dough method.

#### Resource Materials:

- ❖ Sultan, W. J. *Elementary baking*. New York: McGraw-Hill, c1969.
- ❖ Sultan, W. J. *Practical baking*. 5th edition. New York: Van Nostrand Reinhold, c1990
- ❖ Leader, D. & Blahnik, J. *Bread alone*. New York: William Morrow, c1993.

- ❖ Matz, S. *Formulas and processes for bakers*. McAllen, TX: Pan-Tech International, c1987.

**Duration:** Total Hours 10

**Learning Outcomes:**

7.1 Introduction to Methods of Bread Making	General Overview
7.2 Straight Dough Method a) Salt Delayed Method b) No Time Dough Method	<ul style="list-style-type: none"> <li>❖ Understand the Straight Dough Method</li> <li>❖ Learn the Salt Delayed Method and no time Dough Method</li> </ul>
7.3 Sponge and Dough Method	<ul style="list-style-type: none"> <li>❖ Understand and learn the Sponge and Dough Method</li> </ul>

**Assessment Plan: (For the Teachers)**

Unit-7	Topic	Assessment Method	Time Plan	Remarks
7.2	Straight Dough Method a) Salt Delayed Method b) No Time Dough method	Exercise: Question & Answer		
7.3	Sponge and Dough Method	Exercise: Question & Answer		

**7.1 INTRODUCTION TO METHODS OF BREAD MAKING**

Present day bread production scenario has changed to a very large extent in comparison with conventional methods. High speed machine and modern technology has made it possible to produce more, of a better quality and within shorter time. However ; in spite of the benefits of modern technology, it is necessary for a student to understand the conventional methods which is like a stepping stone to modern day practice.



## The Baking Process

The basic process of baking yeast bread starts with measuring and mixing the various ingredients to make the dough and adding yeast so that it rises. The dough is then kneaded to develop the gluten and is again allowed to rise. The kneading and rising steps may be repeated several times. Next, the dough is shaped into a loaf and baked. Baking cooks the dough, firms the loaf and forms a crust on it, and improves the flavor. Finally, the loaf of bread may be sliced before being wrapped.

Commercial bakeries have machines that do the work of measuring, mixing, kneading, baking, slicing, and wrapping. Skilled bakers run the machines, and nothing is left to chance. The ingredients are weighed precisely, the temperature and humidity are closely monitored, and the individual steps of the baking process are carefully timed.



Every bakery uses a special blend of flour, produced by mixing the wheat before or after it has been milled. In most large bakeries the manufacturing process begins in bins on a high floor so that gravity can draw the flour or dough from one machine down to the next.

After a final sifting, the flour is fed into a scale that automatically weighs the right amount and pours it into a mixer on the floor below. Water or another liquid is poured into form dough, and yeast and other ingredients are added. The amount of flour used to make the dough can be affected by the temperature and humidity in the bakery. In addition, the temperature of the water must be exactly correct to dissolve the yeast. The yeast will be killed if the water is even slightly overheated. On the other hand its growth will be stunted by water that is too cold.

In the next step of the manufacturing process, the dough flows into huge troughs that are taken into a fermentation room. It is left there to rise for a set amount of time, usually several hours. Next, a





divider scales the dough into pieces of just the right weight for the baking pans. The rounder shapes the pieces into balls, which then move through the overhead proofer. There the dough rests for a few minutes to recover from the rough dividing and rounding processes, thus ensuring tender loaves.

The balls of dough drop from the overhead proofer into a molder, which shapes them to fit the baking pans exactly. The filled pans are placed in the proof box, where the final rising takes place. The proof box has a slightly warmer and moister atmosphere than that of the fermentation room. The pans then go into an oven, where they are baked at a temperature of more than 400 F (204 C) for about 30 minutes. Low-pressure steam is injected into the oven to prevent the crust from forming too quickly. Most large bakeries use reel ovens or traveling ovens. A reel oven looks like an enclosed Ferris wheel, with the pans of bread on rolling racks. In a traveling oven the pans move slowly on a conveyor belt through a long baking chamber, and the bread comes out the other end. Some traveling ovens measure more than 100 feet (30 meters) in length, and they can bake more than 5,000 loaves of bread per hour.

After the loaves have been slowly cooled, a slicer cuts them into uniform slices. Finally, a wrapping machine places moisture-proof paper around each loaf and seals the paper to keep the bread fresh and protect its flavor. The loaves are then packed into trucks and taken to stores.

The process of making unleavened bread, which is sometimes called no-yeast bread or quick bread, is much simpler than that used for yeast bread. Since the dough contains no yeast, kneading and rising are not involved. The procedure consists merely of measuring and mixing the ingredients and then shaping the dough and baking it.

Bakeries make many products in addition to bread, including rolls, crackers, biscuits, and such pastries as cookies, cakes, pies, and doughnuts. Machines do much of the work in baking these products, as in making bread. Bakers use a variety of devices for molding and cutting and for such operations as making and applying frosting and icing. There are two general kinds of cakes butter cakes and sponge cakes. Butter cakes contain butter or some other fat, plus flour, sugar, eggs, leavening, milk, salt, and flavoring. Bakers make many varieties of these cakes by adding chocolate, molasses, spices, nuts, coconut, or other ingredients. Sponge cakes, such as angel food cakes and similar products, have no fat. They usually consist of flour, eggs, sugar, salt, and flavoring. The eggs provide the



liquid, and the air for rising as well, and cream of tartar is added for lightness and tenderness.

## 7.2 STRAIGHT DOUGH METHOD

In this method all the ingredients are mixed together, and the dough is fermented for a predetermined time. The fermentation time of straight dough depends on the strength of flour. Strong flours require more fermentation time to mature adequately.

Flours which require 2 to 3 hours for maturing should be used for making bread by straight method. Flours that take very long period for maturing should not be used in straight method because during prolonged fermentation periods it is very difficult to control the temperature of dough and rise in temperature will invariably cause acid taste and flavour in bread. As temperature rise has immediate effect on fermentation speed, it is very necessary to control the temperature of a straight dough by;



1. Using shorter fermentation periods
2. Adjusting the temperature of doughing water
3. By fermenting the dough at optimum (room) temperature i.e. between 78 deg. to 80 deg. F.

When it is desired to ferment a straight dough for longer period, it should be remembered that gluten will soften up to a greater extent and is likely to become sticky, therefore the dough should be made tighter. Yeast content should be reduced but sugar content should be increased in order to provide food during prolonged fermentation. Salt content is increased as it provides stability to the dough and keeps the fermentation speed under control which is necessary during long fermentation period.





**(A) Salt-Delayed Method:**

This is a slight variation of straight method, where all the ingredients are mixed except salt and fat. As the salt has a controlling effect on enzymatic action of yeast, the speed of fermentation of a salt less dough will be faster, and a reduction in total fermentation time could be affected. The salt is added at the knock-back stage. The method of adding salt at the later stage may be according to the convenience of individual baker. It may be sifted (dry) on the dough and mixed. It may be creamed with fat and mixed.

Whatever way is chosen for mixing the salt, only three-fourth (of the actual mixing time) mixing should be given initially and one-fourth mixing at the time of adding salt. The method is specially suitable if strong flours are to be used for bread making by straight method. Due to absence of salt, the fermentation speed enhanced and gluten is matured in a reasonably shorter time.

**(B) No Time Dough Method:**

In this method, dough is not fermented in a usual manner. It is just allowed a brief period (about 30 min). for it to recover from the strains of mixing. Since dough is not fermented the twin functions of fermentation (i.e. production of gas and conditioning of gluten) are achieved to some extent by increasing the quantity of yeast (2 to 3 times of original quantity) and by making the dough little slacker and warmer. Although it is possible to make fairly acceptable bread (during emergency) by using this method the product has poor keeping quality and lacks in aroma. Due to absence of fermentation the gluten and starch are not conditioned sufficiently to retain the moisture and there is no flavour because flavour producing bi-products of fermentation are absent. As there is increased quantity of yeast present, the bread may have a strong yeast flavour.

**7.3 SPONGE AND DOUGH METHOD**

Previously, in this chapter it has been mentioned that strong flours take too long for conditioning and should not be used for making bread by straight dough method. For such flours sponge and dough method is more suitable where the problem of controlling the dough temperature is not so acute as the total fermentation time is divided in two



separate segments. For the sake of convenience and proper identification, a sponge-dough is indicated as 60/40 sponge-dough, or 70/30 sponge-dough, where the first numbers i.e. 60 or 70 indicate the percentage of flour used in sponge and the second numbers i.e. 40 or 30 indicate the percentage of flour mixed at the time of dough making.

In this method, as a first step, a part of flour, proportionate amount of water, all the formula yeast and yeast food are mixed together. Longer fermenting sponges may contain some amount of salt also. Mixing operation is carried out just sufficiently to incorporate all the ingredients evenly. This sponge is fermented for pre-determined time. Sponge fermentation time depends on the amount of flour in the sponge and flour quality. The quantity of flour in sponge depends on the strength of flour. If the flour is too strong, more quantity should be used in sponge and in turn the sponge should be fermented for longer duration.



It is advisable to test the sponge physically for its readiness before mixing it into dough. The following methods of sponge testing could be used;

Take a small piece of sponge and try to break it with both hands. If the piece breaks with a clean fracture the sponge is ready for mixing. If sponge is not ready, the piece will stretch to some extent and will break in unevenly stretched shreds. In such case sponge should be allowed more fermentation time.

Tear the sponge apart from the center with both hands and examine the web structure. If the web structure is very fine, the sponge is ready.

An adequately fermented sponge feels dry to touch without any stickiness present.

When the sponge is ready, it should be broken down properly with formula water, so that its even mixing in the dough is assured. Uneven mixing of sponge in the dough should be avoided as it produces uneven results in the bread. Broken down sponge is mixed with the remaining flour, sugar, salt, fat etc. Mixing operation should be carried out to the right degree. If two different kinds of flour are at hand, the weaker flour should be used at the time of dough making.

A decorative header featuring a collage of various breads and pastries, including rolls, buns, and slices of bread, set against a warm, golden background with circular accents.

After the dough is mixed, it is rested for 30 to 45 min. during which time it relaxes from the stress of mixing operation. Pre-conditioned gluten of the sponge hastens the conditioning process of the gluten of fresh flour during this period and the dough is in perfect state for further manipulation i.e. cutting, moulding etc.

### **Ferment and Dough Process:**

This is a variation of sponge and dough method. Very often a (bread product) formula may contain milk, eggs, substantial quantity of fat and sugar as in the case of sweet bread, Danish pastry and other sweet fermented products. All these formula ingredients will have a retarding effect on yeast activity. If all the formula yeast, part of flour, yeast food and sufficient water (to make a fluid batter as in case of flying ferment) are mixed together, the yeast gets initially an environment which is conducive to vigorous activity and the end of fermentation time (of ferment) it is in a fit condition to take on the extra load of fermentation in the presence of milk, eggs, excessive fat etc. Fermentation time of a ferment depends on the formulation of the product desired to be made and the flavor desired in the product but very often it becomes a matter of individual preference eg. some bakers may take the ferment (for mixing) after it is dropped by itself, while others may take it just prior to dropping and some may allow time even after it has been dropped. A ferment containing milk should be guarded against over fermentation as it will develop more than desirable quantity of lactic acid which in turn will affect the flavour, taste and texture of the product.



When a ferment is ready, it is mixed into dough, along with the remaining ingredients and allowed to ferment for the second stage of fermentation before the dough is taken up for make up. This method is used for making enriched bread, buns, Danish pastry, sweet dough, doughnuts etc. where the speed is very necessary.



### Exercise

1. Define the following?
  - Q1) Salt delayed method.
  - Q2) Straight dough method.
  - Q3) Fermented dough method.
  - Q4) Sponge and dough method.
  - Q5) No time dough method.

### Activity:-

- a) Visit a nearby bakery or confectionery to study the bread making process.



# Chapter-8

## Characteristics of a Good Bread

### 8.0 Unit Overview & Description

- Overview
- Knowledge and skill outcomes
- Resource Materials
- Duration
- Learning Outcomes
- Assessment Plan

8.1 Introduction to Characteristics of a Good Bread

8.2 External: Volume, Symmetry of Shape, Bloom, Crust Colour, Evenness of Bake, Oven Break

8.3 Internal: Colour of Bread, Structure, Sheen and Texture, Flavour and Aroma, Crum Clarity, Moistness, Cleanliness

### 8.0 UNIT OVERVIEW & DESCRIPTION

#### Overview:

This unit will make the students understand the characteristics of a good bread. It will also familiarize them with the external and internal factors.

#### Knowledge and skill outcomes:

- i) Learn the external characteristics of a bread.
- ii) Learn the internal characteristics of a bread.

#### Resource Materials:

- Gisslin, W. *Professional baking*. New York : John Wiley & Sons, c1985.
- Sultan, W. J. *Elementary baking*. New York: McGraw-Hill, c1969.
- Sultan, W. J. *Practical baking. 5th edition*. New York : Van Nostrand Reinhold, c1990



**Duration:** Total Hours 14

**Learning Outcomes:**

8.1 Introduction to Characteristics of a Good Bread	General Overview
8.2 External: Volume, Symmetry of Shape, Bloom, Crust Colour, Evenness of Bake, Oven Break	<ul style="list-style-type: none"> <li>❖ Understand the External Characteristics of a Good Bread</li> <li>❖ Learn the various factors</li> </ul>
8.3 Internal: Colour of Bread, Structure, Sheen and Texture, Flavour and Aroma, Crum Clarity, Moistness, Cleanliness	<ul style="list-style-type: none"> <li>❖ Understand the Internal Characteristics of a Good Bread</li> <li>❖ Learn the various factors</li> </ul>

**Assessment Plan: (For the Teachers)**

Unit-8	Topic	Assessment Method	Time Plan	Remarks
8.2	External: Volume, Symmetry of Shape, Bloom, Crust Colour, Evenness of Bake, Oven Break	Exercise: Question & Answer		
8.3	Internal: Colour of Bread, Structure, Sheen and Texture, Flavour and Aroma, Crum Clarity, Moistness, Cleanliness	Exercise: Question & Answer		

**8.1 INTRODUCTION TO CHARACTERISTICS OF A GOOD BREAD**

**How to Judge the quality of Bread**

Most of the commercially produced bread in the country is sandwich type and often top leaved are rarely seen in the market. The reasons for this change maybe many for eg. Non availability of sufficient strong flour to produce open top loaves consumer preference for streamlined square slice of bread continence of bakers in producing sandwich bread convenience in storing sandwich bread and so on.

However for judging the various characteristics and often top bread should be tested as it may not be possible to notice some of the final points of distinction. In case of sandwich bread when lid is put on sandwich bread before baking the expansion of bread during baking operation is restricted, which, in turn, will affect the crumb structure of bread and some other characteristics also. The appearance of an open top loaf will convey quite a bit of information (about its characteristics) to an experience baker while the appearance of sandwich bread may often prove to be delusive. However, in order to make a complete assessment of the quality of bread, it should be examined both for external as well as internal characteristics are as follows:-

EXTERNAL CHARACTERISTICS	INTERNAL CHARACTERISTICS
1. Volume	1. Colour of Bread
2. Symmetry of Shape	2. Structure
3. Bloom	3. Sheen and Texture
4. Crust Colour	4. Flavour and Aroma
5. Evenness of Bake	5. Crumb Clarity & Elasticity
6. Oven Break	6. Moistness
	7. Cleanliness

## 8.2 EXTERNAL

### Volume:

When we see bread, the first thing to catch the eye is its volume. The volume of bread should always be considered in relation to its weight (I.e. specific volume) & for a particular weight of bread; the volume should neither be too big nor too small. Too much volume for the weight of bread indicates too open a texture which entails crumbliness, early staling etc. On the other hand, a small for the corresponding weight of dough is indicative of too close and compact from structure, lack of flavour etc. Factors conducive to acquiring good volume in bread are; sufficient strength in flour, adequate fermentation to achieve proper conditioning of gluten, sufficient diastatic capacity in



flour to maintain gassing power of the dough at the time of baking, proper baking and proofing conditions

### **Symmetry of Shape:**

This is another characteristic of bread (like volume) which will be affected only in the case of open top loaf as sandwich bread is bound to have symmetry of shape (like constant volume). The lower part (trunk) of bread is guided by the walls of the mould, while the other (dome shaped) part has free expansion. There should be such a harmony between these two parts of bread that it presents a pleasing appearance. Even in case of other bread products, i.e. French loaf, Vienna bread, rolls etc., this harmony between its different parts is very important without which the product will present a very poor side. If a piece of dough having (proportionately) more weight is placed in a mould, the lower part will be guided with walls of the mould and will remain as usual but the expansion of the top part will be exaggerated so as to present a non-symmetrical shape. Excess use of bread improvers, too much under or over fermentation, excessive/insufficient proofing, inadequate proofing and baking conditions, are some of the factors which are responsible for imparting round shoulders, caved in sides or bottom, jagged, upper crust, thereby spoiling the symmetry of shape.

### **Bloom:**

This is such a delicate characteristic of bread that it requires a very fine judgment to differentiate it from crust color. Just as a healthy plant or a healthy human being has a different appearance from unhealthy ones, so is the natural bloom of the bread different from artificially acquired shine. If a bread having natural bloom is kept besides bread having artificial shine (acquired by brushing with fat), the difference can easily be made out. The bloom is that natural flush which can be acquired in bread only by the use of good raw material and proper care in each and every stage of processing.

### **Crust Colour:**

Crust of bread is supposed have a pleasing golden brown color. Since caramelization of sugar is responsible for imparting such color to crust, the intensity of color will depend on the quantity of sugar available for caramelization at the time of baking. Yeast also



requires sugar for gas production. Therefore, availability for sugar for caramelization is influenced by the activity of yeast during fermentation time. For whatever reason (such as slack dough, lack of salt, high temperature of fermentation room etc.) , if more sugar is consumed by yeast during fermentation time , the crust color will be pale or light brown . Conversely, if there is lack of yeast activity (as may happen in case of insufficient fermentation time , stiff dough , excessive salt content, chilling of dough etc. ) , there will be more sugar left in the dough which will make the crust color reddish brown (foxy red , harsh brown) that is again not very pleasing to the eye apart from over or under fermentation, some other factors also influence crust color such as proofing conditions, oven temperature, milk content of the formula, type of bread improvers used, consistency of dough, diastatic activity of flour, amount of bleaching flour is subjected to etc.

#### **Evenness of Bake:**

Bread should have even golden brown crust color all around. Since the top crust remains in direct contact with hot air, it will naturally acquire slightly darker color, but this darkness of top crust should be in consonance with the color of the remaining crust. In case of single bread mould (as against striped set of moulds) are used in bakery, bread is likely to have uneven crust color If the moulds are set in the oven too close to each other in that case, the side of the bread which is in close contact with the other mould will not get proper color as there is no gap in between for circulation of heat. Precisely, for this reason the moulds should be set in oven half an inch apart and parallel to each other in order to allow free and even flow of heat. In ovens also there are likely to be hot and cold spots. In that case too, bread will have an even crust color. Over fermentation or oven proofing will create a condition where large gas pockets will remain entrapped between walls of the mould and body of bread. In that case the whole body of bread will not remain in touch with the mould and heat absorption will be uneven and crust color will also be uneven.

#### **Oven Break:**

When an open top loaf is being baked, crust formation on the side and top of bread takes place earlier while there is still no crust formation on the portion of the bread which is



nearest to the upper edge of the mould. When the expansion takes place in the inner part of bread, the gas stretches this weaker part and escapes through the opening thus created. This is called break. At this break, stretches and coagulated gluten strands could be clearly seen. The characteristics of the break are known as shred. If the flour is of good strength, dough is correctly fermented, proofing and baking conditions are proper, and then the break must be smooth which is invariably a sign of good bread. It has been discussed earlier that the gluten of dough should be so conditioned during fermentation that it could stretch with expanding gas & still have sufficient resistance to retain gas. It is the adequate balance between these two conditions which come from proper fermentation and which is responsible for giving a smooth break. If the dough is under fermented, the gluten will have more resistance & it may tear apart under pressure for expanding gas giving an exaggerated break or even a shell top. Conversely, if the dough is over fermented, there will be no resistance left in the dough and there will be blind appearance that is there will be no break. Apart from proper fermentation the bread shred is also affected by correct moulding, adequate proofing and sufficient humidity in the proofing room and the oven.

### 8.3 INTERNAL

#### Colour of Bread:

Obviously the internal color of bread will be influenced by the grade of flour but it is also true that the different batches of the bread made from the same flour may have different internal color. This is so because the visual effect of whiteness of bread crumb is decided by the amount of light reflected from the crumb surface. If more amount of light is reflected from the crumb surface, the crumb will appear whiter while if the crumb surface absorbs more light and very little is reflected result will be darker appearing crumb. A crumb structure made up of small even sized, oblong and shallow gas cells will reflect more light in comparison with another crumb which has a structure made up of uneven sized, deep and round shape cells because in this case lighter will be absorbed by the crumb and reflection will be very poor. If the cell walls are thin, a part of light falling on a cell will be passed through into the neighboring cell and the intensity of reflected light will increase thereby enhancing the visual effect of whiteness of crumb. Bread having thick cell walls will not allow this refraction of light into the neighboring cells and



the crumb will appear to be comparatively darker. Factors which influence the crumb structure are quality of flour, degree of fermentation, manipulation of dough , proofing and baking conditions .

#### **Structure:**

If the crumb structure of different kinds of bread products is closely observed, it will be seen that shape and size of gas cells varies considerably eg. Regular white bread will have oblong shaped small gas cells which are evenly distributed throughout the crumb, while a French loaf will have round gas cells of an even size an un evenly distributed in the crumb. In case of whole meal (brown) bread, the gas cells will be very small due to presence of bran which has a cutting action on gluten strands thus preventing them from stretching. Structure of different kinds of bread products must vary due to difference in formula, fermentation, manipulation, baking conditions and so on. For eg. , healthy type products are made from strong flour , lean formula is used , makeup is of different kind and baking is done on a flat surface without a support of a mould which will result in a structure having round , uneven size and unevenly distributed gas cells . While in case of white bread, although same strong flour is used, but the formulation, makeup, proofing and baking conditions are different which produce a structure having even sized, oblong gas cells. But the structure of similar kind of product will be influenced by the quality of raw material, degree of fermentation, manipulation of dough and proofing and baking conditions. Slack dough will produce bread having open structure and large holes while tight dough will produce bread with close structure.

#### **Sheen and Texture:**

If the crumb structure of bread is made up of small , oblong , shallow and evenly distributed gas cell having thin cell walls , the cut surface of the bread slices will not only appear bright but will also appear to be full of small sparkling objects which is nothing but increase intensity of reflected light due to thinness of cells walls . This characteristic is known as sheen. If a cut surface of bread slice is gently pressed with fingertips, the sensation could be that pf smooth silkiness (like velvet) , or hardness (like a drum) , or coarseness (like jute bag) and so on . This sensation of touch is known as texture of bread. The texture which is soft, silky and still with certain degree of firmness is considered to be good. a slack dough or too much final proofing will produce a bread having open crumb



structure which will be soft to touch but will be coarse. Such texture is known as wooly. Excessive tightening action on flour proteins as in the case of too much milk in the formula or high level of potassium bromate will produce bread with such a compact crumb that it will appear almost like a block of cheese. This is known as cheesy texture. Bread made from under fermented or too type dough will have a texture which is very tight, hard to press and rough, known as dummy texture.

### **Flavour and Aroma:**

Taste of any bakery product could be fully appreciated only when it is accompanied by matching flavor. A cake or cookie or bread product cannot be enjoyed if there is no flavor present. In case of bread, a no. of acid and other byproducts are produced during fermentation time. When these acids etc. come in contact with heat during baking, they impart special flavor to bread. Therefore the byproduct of fermentation has a major role to play in deciding the flavour of bread. If dough remains under fermented, there will not be enough by-products present and consequently bread will lack in aroma. On the other hand, over fermentation will produce excessive quantities of acids etc. and the flavour will be too strong (nourish) sometime termed as gassy. High temperature of dough during fermentation or too much temperature. In the fermentation room will produce acidic flavour. Excessively long fermentation period will produce a flavour similar to that of rancid butter. Some of the ingredients used in bread making, also, either impart flavour to bread or enhance the natural flavour of other ingredients thereby improving the overall flavour of bread. Such ingredients are salt, sugar, malt and milk. Slat is one ingredient which exerts a considerable influence on the flavour of bread therefore, optimum quantity of salt should be used in bread formula.

### **Crumb Clarity and Elasticity:**

When a thin slice of bread is held against bright light, the whole surface should appear translucent. But at times dark spots are likely to be seen through which light will not pass. Such a dense spot feels hard t touch and is known as core. Improper mixing of dough is a major cause for having course in bread. Scrapping of dough (connected from table, mixing bowl etc.) should be properly mixed with the rest of dough before it is set for fermentation. If dough has crusted at fermentation or makeup stage, this crust will get



folded during moulding operation and will form hard cores in the crumb. Dense layers in the crumb structure are known as seams. If a fully extended loaf is mishandled while placing it in the oven, some portion of web like structure may collapse resulting in the formation of seams. When the crumb of bread is pressed (gently) , it should not break and when the pressure is released , it should come back to its original shape . This quality of bread is called as elasticity. If bread does not have the quality of elasticity, the pressure of slicing blades will break the crumb rather than cutting it in neat slice. Such a bread slice will not be easy to butter also, as a pressure from butter knife will also break the crumb. Good quality flour and adequate fermentation are the important factor which influences the elasticity of bread.

#### **Moistness:**

Quality of freshness of bread is just by the degree of its moistness. Moistness is influenced by the condition of gluten and starch in the bread. Bread may contain more amount of moisture and still be divide the quality of moistness. If the gluten is adequately conditioned during fermentation stage, it will form a very fine web like structure having thin cells walls thereby enhancing the moisture holding capacity of bread. Similar, the proper conditioning of starch which is influenced by the action of diastase enzyme will also improve the moisture holding capacity of bread. Some of the bread making ingredients e.g. Salt, Fat, Sugar, Malt help in retaining moisture in bread. If the bread is baked at low temp. it will have to be baked for longer time which will result in evaporation of more moisture from bread . A bread store should have relative humidity of about 60%. Lack of humidity will rob the bread of its moistness.

#### **Cleanliness:**

This is such a characteristic of bread which is hardly, is ever, and has any bearing with quality of raw material, or inadequacies during processing. Cleanliness of the products depends on the care a baker takes in handling the production. All the labor put in producing good bread maybe wasted if the baker is not careful in handling the finished product. Absolute care is necessary during baking, depanning, cooling, slicing and packing operations as these are the stages when bread is likely to lose its quality of cleanliness. No object, which is not absolutely clean, should ever be allowed to come in



contact with the product. It is the sacred duty and social obligation of a baker to maintain perfect standards of personal hygiene as well as cleanliness of his establishment.

### Exercise

#### Activity:-

Q1) Write the components of flour along with their percentages?

Q2) Define the following?

- a) Gelatinisation
- b) Gluten



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