

PGDBST

Course Curriculum for

Post Graduate Diploma in Bakery Science and Technology

Through Distance Education

(w.e.f. 2003-04)



**Directorate of Distance Education
Guru Jambheshwar University
Hisar-125001**

COURSE STRUCTURE AND SCHEME OF EXAMINATION

		Maximum Marks	
		External	Internal
PGDBST-01	Wheat grain structure, quality and milling	80	20
PGDBST-02	Functionality of wheat flour components and bakery ingredients	80	20
PGDBST-03	Quality testing of wheat flour and bakery products	80	20
PGDBST-04	Rheology and chemistry of dough	80	20
PGDBST-05	Bread insutry and processes	80	20
PGDBST-06	Soft wheat products and processes	80	20

- Internal assessment will be based on evaluation of assignments.

Note : There will be 8 questions in all covering whole of the syllabus with 2 questions from each unit. The candidate will have to attempt 5 questions in all, selecting at least one question from each unit.

- I. Classification and structure of wheat grain :** Origin, production and classification of wheat. Grain size and morphology - sources of grain size variation, relationship of grain size with endosperm content, protein content, protein quality and alpha - amylase activity. Physico - chemical basis of wheat grain hardness/softness. Structural components of wheat grain - caryopsis, endosperm and embryo. Chemical composition of wheat kernel.

- II. Criteria of wheat quality :** Botanical and physical characteristics that determine wheat quality - species and varieties, test weight and kernel weight, kernel size, shape and kernel hardness. Chemical characteristics that determine wheat quality - moisture content, protein content, protein quality, alpha amylase activity and ash content.

- III. The milling process and milled products :** Preparation of wheat for milling, aims of flour milling, milling process - general principle, cleaning, tempering/conditioning and milling streams. Flour streams, extraction rates and their composition. Milling machinery, milling by products, soft wheat milling and durum wheat milling.

- IV. Experimental milling and milling research :** Air classification, tempering and automation. Procedures and equipments of experimental milling, interpretation of results.

Reference Books :-

1. Wheat chemistry and technology, Volume-I by Y. Pomeranz
2. Wheat chemistry and technology, Volume-II by Y. Pomeranz
3. Chemistry and technology of cereal as Food and Feed by A.M. Samuel
4. Wheat flour milling by S.S. Posner and A.N. Hibbs

- I. **Proteins and Enzymes :** Composition, classification and structure of wheat proteins functionality of wheat proteins in bread, biscuits, cookies and cakes. Manufacturing techniques, uses and functionality of vital wheat gluten. Enzymes of wheat and their technological significance.
- II. **Lipids and starch :** Effects of lipids on rheological properties, functionality of defatted flours, role of wheat flours lipids fractions, lipids and bread making potential, effects of lipids on biscuit and cake quality. Role of damaged starch in bakery products, starch and bread staling.
- III. **Functionality of major ingredients :** Role of water in the formation and processing of bread, biscuit and cookie dough. Contribution of water during processing, baking, cooling and freezing of the dough. Effects of water on bakery product texture properties. Baker's yeast - production, properties and its functions in fermented bakery products. Functions of salt, sweeteners and fats in bakery products.
- IV. **Functionality of minor ingredients :** Functions of milk and milk products, malt and malt products, yeast food, oxidizing agents, reducing agents, surfactants and anti-microbial agents.

Reference Books :-

1. Principles of cereal science and technology by R.C. Hosney
2. Cereals in breadmaking by A.C. Eliasson and K. Larsson
3. Advances in cereal science and technology by Y. Pomeranz

- I. **Physicochemical Tests** : Principles and methods of estimation of moisture, protein, ash, minerals, fats, diastatic activity, starch damage content, maltose value, flour colour grade value and flour particle size distribution.
- II. **Functional tests** : Principles and methods of estimation of gluten quantity, SDS-Sedimentation volume, falling number, dough raising capacity and alkaline water retention test. Significance of above tests in relation to bread, biscuits and cakes.
- III. **Rheological tests** : Application of dough recording mixers for assessing physical properties of the dough such as mixing behavior, water absorption, dough strength and stability. Determination of Extensograph characteristics of the dough. Application of viscoamylograph in dough testing.
- IV. **Specifications for bakery ingredients and products** : BIS/PFA standards for whole wheat flour (atta), protein rich flour, maida, fortified maids, protein rich maids, suji (semolina), BIS/PFA standards for wheat flour used in bread/biscuit industry, limits for heavy metal contaminants in food grains under PFA rules, limits of pesticides/insecticides residues in food grains/milled food grains

Reference Books :-

1. Cereals and cereals products by D.A.V. Dendy and B.J. Dobraszczyk
2. Handbook of cereal science and technology by K. Kulp and J.G. Ponte
3. Wheat chemistry and technology, Volume-II by Y. Pomeranz

- I. **Basic approaches to dough rheology :** Dough structure and basics of rheology. Creep and recovery, viscometry, stress relaxation, oscillatory measurements. Empirical and fundamental testing.
- II. **Rheology of dough and gluten :** Rheological behavior of dough and gluten. Rheological properties of dough from high extraction, whole wheat and composite flours. Importance of dough and gluten viscoelasticity in gas retention and bread making.
- III. **Bakery ingredients and dough rheology :** Effects of water, yeast, oxidation and compounds with disulfide and thiol groups, sugar and emulsifiers on rheological properties of dough.
- IV. **Flour constituents, processing parameters and dough rheology :** Influence of proteins, gluten, starch and enzymes on rheological properties of dough. Effects of mechanical work, mixing time and temperature on dough rheology.

Reference Books :-

1. Cereals in breadmaking by A.C. Eliasson and K. Larsson
2. Fundamentals of dough rheology by H. Faridi and J.M. Faubion

- I. **Bread making process** : Status of bakery industry, bread formulation, basic bread making procedure - mixing, fermentation, proofing and baking. Functions of mixing, types of mixer, functions of moulding and dividing, functions of proving, changes during mixing, fermentation and baking unit operations.
- II. **Developments in bread making processes** : Straight dough process, sponge dough process and chemical dough development process, frozen dough process, micro-wave process. Advantages and limitations of various bread processes. Packaging of bread.
- III. **Variety bread products** : Multigrain bread, high fibre bread, cracked wheat bread, sour dough bread, milk bread, composite flour bread, high protein bread, wheat germ bread, sugar free bread, low calorie bread, low salt bread and gluten free bread. Formulations and processing of variety breads. Assessment of quality of bread.
- IV. **Bread spoilage and staling** : Microbial spoilage of bread - mold, bacteria and yeast spoilage. Control of microbiological spoilage of bread. Bread staling - crust and crumb staling, role of bread ingredients in staling. Staling inhibitors - enzymes, emulsifiers, pentosans, alcohol and sugars. Freezing of bread.

Reference Books :-

1. Technology of bread making by S.P. Cauvain and L.S. Young
2. Cereals processing technology by G. Owens
3. Wheat chemistry and technology, Volume-II by Y. Pomeranz

- I. **Classification and processing technology of biscuits :** Hard dough biscuits - ingredients and formulations, dough mixing, forming, baking, flavoring, cooling and packaging, Soft dough biscuits - ingredients and formulations, dough mixing, forming, baking, flavoring, cooling and packaging. Factors affecting biscuit dough spread during baking.
- II. **Classification and processing technology of cookies :** Types of cookies, general process of cookies production - mixing, dough sheeting, baking, cooling and packaging.
- III. **Classification and processing technology of cakes :** Types of cakes, formula balance in cake, production of cakes and pastry - mixing, baking, cooling and packaging. Cakes faults - shape, structure, texture, crust and colour faults. Remedies of cake faults.
- IV. **Crackers and miscellaneous biscuit like products :** Classification of crackers - cream, soda and snack crackers. Manufacturing technology of crackers. Wafers and pretzels biscuits.

Reference Books :-

1. Cereals and cereals products by D.A.V. Dendy and B.J. Dobraszczyk
2. Technology of biscuits, crackers and cookies by D. Manley
3. Wheat Chemistry and technology, Volume-II by Y. Pomeranz

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