

Rayat Shikshan Sanstha's  
**Arts, Science and Commerce College,**  
**Ramanandnagar(Burli)**

**Department of Botany**

**Career Oriented Course**  
**On**

**Food Processing and Preservation**

**2019-2020**

**Rayat Shikshan Sanstha's**  
**Arts, Science and Commerce College, Ramanandnagar(Burli)**  
**Department of Botany**  
**Career Oriented Course 2019-2020**

1	Name of the Department	Botany
2	Name of the Course	Food Processing and Preservation
3	Number of Students Enrolled	65
4	Fee Structure	Free of Cost
5	Syllabus and Time-table	Yes- Attached
6	Attendance Sheet	Yes- Attached
7	Report of Course	Yes- Attached

Rayat Shikshan Sanstha's  
Arts, Science and Commerce College, Ramanandnagar(Burli)  
Department of Botany  
Career Oriented Course 2019-2020

**Time Table**

Period Number	Time	Days		
		Monday	Tuesday	Wednesday
1.	10.10AM- 11.00AM	SJS	BAS	SJS
2.	11.00AM- 2.30PM	SJS	BAS	BAS

**Admission:****Intake capacity:**

20 students every year on the basis of merit of B.Sc-I (Chemistry / Botany / Zoology group) which includes 10% students from other university.

**Eligibility for Admission:**

Students with the following Higher Secondary Certificate with a minimum of 40 % marks will be eligible for admission.

**Course Structure:**

<b>Paper-I:</b>	Principles of food processing & preservation	
	Food quality and safety management	100
<b>Paper-II</b>	Fruit and vegetable technology &	
	Milk and milk products	100
<b>Practical</b>		50
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		250

**Paper-I      Principles of food processing and preservation &  
Food quality and safety    Management**

**Section - I****[Principles of food processing and preservation]****Unit-1**

Introduction to process operations, principles, good manufacturing practices (10 lectures)  
Food Laws and Regulations

**Unit-2**

- General principles of food processing and preservation. (10 lectures)
- 2.1: Physical principles in food processing operations Asepsis, removal of microorganisms, maintenance of anaerobic conditions
  - 2.2: Thermal processing – Degree of processing or preservation, selecting heat treatment, heat resistance of microorganisms, nature of heat transfer, protective effects of food constituents, types of thermal treatments
  - 2.3: Ionising radiations – Forms of radiant energy; ionizing radiations, sources and properties; radiation units; radiation effects; limiting indirect effects; dose fixing factors; objectives in food irradiation; safety and quality of irradiated food; irradiation of various foods and comparison with other methods of preservation
  - 2.4: Refrigeration – Refrigeration, cool storage and shelf life extension; cool storages with air circulation, humidity control and gas modifications (i.e. CA, MA & SA)
  - 2.5: Freezing: changes during freezing, rate of freezing, choice for final temperature for frozen foods, freezing methods, freezing effects.
  - 2.6: Dehydration – Dehydration, water activity and food safety / quality; methods of dehydration



**Unit-3** (10 lectures)

Chemical principles in food processing

- 3.1 : Preservation / processing by sugar, salt, curing, smoke, acid and chemicals; chemical changes in foods that affect texture, flavour, colour, nutritive value and safety during handling, storage and processing; Chemical and biochemical reactions affecting food quality and safety.

**Unit-4** (10 lectures)

- 4.1. Introduction: Classifications of fruits & vegetables.

Extraction of fruit juices, Selection of raw material, crushing, pressing, filtration, processing & bottling.

Fruit products- Jam, Jelly, Marmalade, Squashes, Syrups, Cordials and crush-definition & general flow sheet of preparation.

- 4.2. Vegetable Products:

Tomato Products: Definition & general flow sheet for the preparation of tomato soup, tomato puree, tomato sauce, tomato ketchup & tomato paste.

**Section – II**

**[Food quality and safety Management]**

**Unit-1** (10 lectures)

Objectives, importance and functions of quality control. Methods of quality, assessment of food materials-fruits, vegetables, cereals, dairy products, meat, poultry, egg and processed food products.

**Unit-2** (10 lectures)

Sanitation and hygiene, GMP, GLP, Statistical quality control. Food laws and standard, PFA, AGMARK.

**Unit-3** (10 lectures)

Sampling and specification of raw materials and finished products, Concept of Codex Alimentarius / USFDA / ISO 9000 series, rules and regulations for waste disposals.

**Unit-4** (15 lectures)

Food adulteration and food safety. HACCP, Sensory evaluation-introduction, panel screening, Sensory and instrumental analysis in quality control, IPR and patents.

**Suggested Readings**

1. Arsdel W.B., Copley, M.J. and Morgen, A.I. 1973. Food Dehydration, 2<sup>nd</sup> Edn. (2 vol. Set). AVI, Westport.
2. Bender, A.E. 1978. Food Processing and Nutrition. Academic Press, London.
3. Fellows, P. and Ellis H. 1990. Food Processing Technology: Principles and Practice, New York.
4. Jelen, P. 1985. Introduction to Food Processing. Prentice Hall, Reston Virginia, USA.
5. Lewis, M.J. 1990. Physical Properties of Food and Food Processing Systems. Woodhead, UK.
6. Wildey, R.C. Ed. 1994. Minimally Processed Refrigerated Fruits and Vegetables. Chapman and Hall, London
7. Amerine, M.A. Pangborn, R.M., and Rossler, E.B. 1965. Principles of Sensory Evaluation of Food. Academic Press, New York.
8. Birk, G.G., Herman, J.G. and Parker, K.J. Ed. -1977. Sensory Properties of Foods. Applied Science, London.

9. Charalambous, G. and Inglett, G. 1981. The Quality of Foods and Beverages. (2 vol.set). Academic Press, New York.
10. Furia, T.E. Ed. 1980. Regulatory Status of Direct Food Additives. CRC Press, Florida.
11. Krammer, A. and Twigg, B.A. 1970. Quality Control for the Food Industry. 3rd Edn. AVI, Westport.
12. Pattee, H.E. Ed. 1985. Evaluation of Quality of Fruits and Vegetables. AVI, Westport.
13. Ranganna, S. 1986. Handbook of Analysis and Quality Control for Fruits and Vegetable Products. Tata McGraw Hill, New Delhi.
14. Tannenbaum, S.R. Ed. 1979. Nutritional and Safety Aspects of Food Processing, Marcel Dekker, New York.

## **Paper-II      Fruit and vegetable technology & Milk and milk products**

### **Section - I**


#### **[Fruit and vegetable technology]**

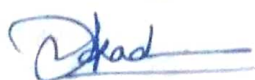
- Unit-1** (10 lectures)  
Principles and methods of fruit and vegetable preservation. Principles of storage of fruits and vegetables. Types of storage: natural, ventilated low temperature storage. Freezing and freeze- drying of fruits and vegetables.
- Unit-2** (10 lectures)  
Drying and dehydration of fruits and vegetables, problems related to storage of dehydrated products. Canning of fruits and vegetables, tin cans, glass containers, aseptic canning technology.
- Unit-3** (10 lectures)  
Fruit and vegetable juices, preparation of syrups, cordials and nectars, juice concentrates pectin and related compounds, jams, jellies, marmalades, preserves, pickles, chutneys, tomato products.
- Unit - 4** (10 lectures)  
Fruit product order and quality control, carbonated beverages. Processing of mineral water and water standards for food processing plants.

### **Section - II**

#### **[Milk and milk products]**

- Unit-1** (10 lectures)  
Sources and composition of milk, processing of market milk, Standardization, toning of milk, homogenization, pasteurization, sterilization, storage, transportation and distribution of milk.
- Unit-2** (10 lectures)  
Milk product processing-cream, butter, condensed milk, evaporated milk, whole and skimmed milk powder.
- Unit-3** (10 lectures)  
Instantization of milk and milk products, ice cream, khoa, channa, paneer, milk sweets. Judging and grading of milk and its products.
- Unit-4** (10 lectures)  
Fermented milk products. cheese, cheese spread, Youghurt, dahi shrikhand and similar products. Dairy equipments and sanitization

  
Head  
Department of Botany

  
Principal  
Arts, Science & Commerce College,  
Ramannadnagar (Burli)



## Suggested Readings

1. Bose, T.K. Ed. 1985. Fruits of India: Tropical and Sub-tropical. Naya Prokash, Calcutta.
2. Dauthy, M.E. 1997. Fruit and Vegetable Processing. International Book Distributing Co. Lucknow, India.
3. Hamson, L.P. 1975. Commercial Processing of Vegetables. Noyes Data Corporation, New Jersey.
4. Jagtiani J., Chan, H.T. and Sakal, W.S. Ed. 1988. Tropical Fruit Processing Academic Press, London.
5. Kadar, A. A. 1992. Postharvest Technology of Horticultural Crops. 2nd Ed. University of California.
6. Lai, G., Siddappa, G. and Tondon G.L. 1986. Preservation of Fruits and Vegetables, Indian Council of Agriculture Research, New Delhi.
7. Salunkhe, D.K. and Kadam, S.S. Ed. 1995. Handbook of Fruit Science and Technology: Production, Composition and Processing. Marcel Dekker, New York.
8. Salunkhe, D.K. and Kadam, S.S. Ed. 1995. Handbook of Vegetable Science and Technology. Production, Composition, Storage and processing Marcel Dekker, New York.
9. Seymour, G.B., Taylor, J.E. and Tucker, G.A. Ed. 1993. Biochemistry of Fruit Ripening. Chapman and Hall, London.
10. Srivastava, R.P. and Kumar, S. 1998. Fruit and Vegetable Preservation: Principles and Practices. 2nd Ed. International Book Distributing Co. Lucknow.
11. Ting, S.V. and Rousett, R.L. 1986. Citrus Fruits and Their Products. Marcel Dekker, New York.
12. Thurme S. Ed. 1991. Food Irradiation. Elsevier Applied Science, London.
14. Wills, R.B.H., McGlasson, W.B., Graham, W.B., Lee, T.H. and Hall, E.G. 1981.
15. Postharvest: An Introduction to the Physiology and Handling of Fruits and Vegetables. Granada, U.K.
16. Considine, D.M. Ed. 1982. Foods and Food Production Encyclopaedia, VNR, New York.
17. Dey, S. 1994. Outlines of Dairy Technology. Oxford Univ. Press, New Delhi.
18. MacCrae, R., Robinson, R.K. and Sadler, M.J. Ed. 1993. Encyclopaedia of Food Science, Food Technology and Nutrition Academic Press, London.
19. Robinson, R.K. (2 vol. set). 1986. Modern Dairy Technology Elsevier Applied Science, UK.
20. Rosenthal, I. 1991. Milk and Milk Products. VCH, New York.
21. Warner, J.M. 1976. Principles of Dairy Processing. Wiley Eastern Ltd. New Delhi.
22. Yarpar, WJ. and Hall, C.W. 1975. Dairy Technology and Engineering AVI, Westport.

## Practical

01. To determine the moisture content of a given sample of tomatoes.
02. To check the degree brix of a given sample.
03. Preparation of cake.
04. Measurement of water activity in fresh fruits / dehydrated fruits –dried vegetables, milk powder
05. Low temperature processing of fruits, vegetables (after giving appropriate pre-treatment)
06. Frozen food processing: fruit pulp processing

## Rayat Shikshan Sanstha's

## Department of Botany

## Attendance

Sr No	Name of the Students	04/12	05/12	06/12	07/12	08/12	09/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	17/12	18/12	19/12	20/12	21/12	22/12	23/12	24/12	25/12	26/12	27/12	28/12	29/12	30/12	31/12	01/01	02/01	03/01	04/01	05/01	06/01	07/01	08/01	09/01	10/01	11/01	12/01	13/01	14/01	15/01	16/01	17/01	18/01	19/01	20/01	21/01	22/01	23/01	24/01	25/01	26/01	27/01	28/01	29/01	30/01	31/01																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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**Department of Botany**  
**Career Oriented Course 2019-20**  
**Food Processing and Preservation**

**Annual Report on Career Oriented Course 2019-20**

The Department of Botany is consistently engaged in running Career Oriented Course that viz. Food Processing and Preservation. Apart from the main course students can undergo such additional training course on topics relevant to their career.

There were total 65 students have enrolled for this course. Students who were beneficiaries for this course showed enthusiasm while learning the techniques of this course and loved to learn how this course will help them to set their career.

  
Department of Botany  
Head of the Department

  
**Principal**  
Arts, Science & Commerce College,  
Ramannadnagar (Burli)