

# **JEPPIAAR ENGINEERING COLLEGE**

**JEPPIAAR NAGAR, CHENNAI – 119**



## **DEPARTMENT OF BIOTECHNOLOGY**

### **QUESTION BANK**

# **BT 6003 – PRINCIPLES OF FOOD PROCESSING**

**REGULATION 2013**

## **III YEAR & V SEMESTER**

**BATCH : (2016-2020)**

**NAME:-----**

**REG. NO:-----**

VISION OF THE INSTITUTION	
To build jeppiaar engineering college as an institution of academic excellence in technological and management education to become a world class university.	
MISSION OF THE INSTITUTION	
<b>M1</b>	To excel in teaching and learning, research and innovation by promoting the principles of scientific analysis and creative thinking.
<b>M2</b>	To participate in the production, development and dissemination of knowledge and interact with national and international communities.
<b>M3</b>	To equip students with values, ethics and life skills needed to enrich their lives and enable them to meaningfully contribute to the progress of society.
<b>M4</b>	To prepare students for higher studies and lifelong learning, enrich them with the practical and entrepreneurial skills necessary to excel as future professionals and contribute to Nation's economy
PROGRAM OUTCOMES (POS)	
<b>PO 1</b>	<b>Engineering knowledge: Apply</b> the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO 2</b>	<b>Problem analysis: Identify, formulate, review</b> research literature, and <b>analyze</b> complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO 3</b>	<b>Design/development of solutions: Design solutions</b> for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
<b>PO 4</b>	<b>Conduct investigations of complex problems: Use</b> research-based knowledge and research methods including <b>design</b> of experiments, <b>analysis</b> and <b>interpretation</b> of data, and <b>synthesis</b> of the information to provide valid conclusions.
<b>PO 5</b>	<b>Modern tool usage: Create, select, and apply</b> appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
<b>PO 6</b>	<b>The engineer and society: Apply</b> reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
<b>PO 7</b>	<b>Environment and sustainability: Understand</b> the impact of the professional engineering solutions in societal and environmental contexts, and <b>demonstrate</b> the knowledge of, and need for sustainable development.
<b>PO 8</b>	<b>Ethics: Apply</b> ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO 9</b>	<b>Individual and team work: Function effectively</b> as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO 10</b>	<b>Communication: Communicate effectively</b> on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and <b>design</b> documentation, <b>make</b> effective presentations, and <b>give</b> and <b>receive</b> clear instructions.
<b>PO 11</b>	<b>Project management and finance: Demonstrate</b> knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to <b>manage</b> projects and in multidisciplinary environments.
<b>PO 12</b>	<b>Life-long learning: Recognize</b> the need for, and have the preparation and ability to <b>engage</b> in independent and life-long learning in the broadest context of technological change.

VISION OF THE DEPARTMENT	
<ul style="list-style-type: none"> <li>To pursue excellence in producing bioengineers coupled with research attributes.</li> </ul>	
MISSION OF THE DEPARTMENT	
M1	To <b>impart</b> quality education and <b>transform</b> technical knowledge into career opportunities.
M2	To <b>establish</b> a bridge between the <b>program and society</b> by <b>fostering</b> technical education.
M3	To <b>generate societal conscious technocrats</b> towards <b>community development</b>
M4	To <b>facilitate higher studies</b> and research in order to have an <b>effective career</b> / entrepreneurship.
PROGRAM EDUCATIONAL OBJECTIVES (PEOS)	
PEO - 1	To impart knowledge and produce competent graduates in the field of biotechnology
PEO - 2	To inculcate professional attributes and ability to integrate engineering issues to broader social contexts.
PEO - 3	To connect the program and community by fostering technical education.
PEO - 4	To provide a wide technical exposure to work in an interdisciplinary environment
PEO - 5	To prepare the students to have a professional career and motivation towards higher education.
PROGRAM SPECIFIC OUTCOMES (PSOS)	
PSO 1	<b>Professional Skills:</b> This programme will provide students with a solid foundation in the field of Biological Sciences and Chemical engineering enabling them to work on engineering platforms and applications in Biotechnology as per the requirement of Industries, and facilitating the students to pursue higher studies
PSO 2	<b>Problem-solving skills:</b> This programme will assist the students to acquire fundamental and problem solving knowledge on subjects relevant to Biotechnology thereby encouraging them to understand emerging and advanced concepts in modern biology
PSO 3	<b>Successful Career and Entrepreneurship:</b> Graduates of the program will have a strong successful career and entrepreneurial ability with the blend of inputs from basic science, engineering and technology, thereby enabling them to translate the technology and tools in various industries and/or institutes

**OBJECTIVES:**

To enable the students

- To know about the constituents and additives present in the food.
- To gain knowledge about the microorganisms, which spoil food and food borne diseases.
- To know different techniques used for the preservation of foods.

**UNIT I FOOD AND ENERGY**

9

Constituents of food – carbohydrates, lipids, proteins, water, vitamins and minerals, dietary sources, role and functional properties in food, contribution to organoleptic and textural characteristics.

**UNIT II FOOD ADDITIVES**

9

Classification, intentional and non-intentional additives, functional role in food processing and preservation; food colourants – natural and artificial; food flavours; enzymes as food processing aids.

**UNIT III MICROORGANISMS ASSOCIATED WITH FOOD**

9

Bacteria, yeasts and molds – sources, types and species of importance in food processing and preservation; fermented foods and food chemicals, single cell protein.

**UNIT IV FOOD BORNE DISEASES**

9

Classification – food infections – bacterial and other types; food intoxications and poisonings – bacterial and non-bacterial; food spoilage – factors responsible for spoilage, spoilage of vegetable, fruit, meat, poultry, beverage and other food products.

**UNIT V FOOD PRESERVATION**

9

Principles involved in the use of sterilization, pasteurization and blanching, thermal death curves of microorganisms, canning; frozen storage-freezing characteristics of foods, microbial activity at low temperatures, factors affecting quality of foods in frozen storage; irradiation preservation of foods.

**TOTAL : 45 PERIODS****OUTCOMES:**

Through this subject the student can understand about

- Different constituents present in food and microorganism involved in processing of food.
- Principles and different preservations techniques of food can also be known.
- Unit operations in modern food processing and impact of the process on food quality

**TEXTBOOKS:**

1. T.P. Coultate – Food – The Chemistry Of Its Components, 2nd Edn. Royal Society, London, 1992.
2. B. Sivasanker – Food Processing And Preservation, Prentice-Hall Of India Pvt. Ltd. New Delhi 2002.

**REFERENCES:**

1. W.C. Frazier And D.C. Westhoff – Food Microbiology, 4th Ed., Mcgraw-Hill Book Co., New York 1988.
2. J.M. Jay – Modern Food Microbiology, Cbs Pub. New Delhi, 1987.

CO NO	COURSE OUTCOME
C305.1	To <b>know</b> about the <b>constituents</b> and additives present in the food.
C305.2	<b>Gain</b> knowledge about additives, colourants and enzyme usage in food and its application
C305.3	<b>Learn</b> about the microorganisms associated with food
C305.4	<b>To gain knowledge</b> about the microorganisms, which spoil food and food borne Diseases and their remedy
C305.5	To know <b>different techniques</b> used for the preservation of foods.

**BT6003 – PRINCIPLES OF FOOD PROCESSING**  
**TOTAL : 45 PERIODS**

S. No.	Title	Reference Book	Page No.
<b>UNIT I</b> <b>FOOD AND ENERGY (9)</b>			
1.	Constituents of food – carbohydrates, dietary sources, role and functional properties in food, contribution to organoleptic and textural characteristics.	Food processing and preservation by Sivasankar	20-38
2.	Constituents of food – lipids, dietary sources, role and functional properties in food, contribution to organoleptic and textural characteristics.	Food processing and preservation by Sivasankar	39-51
3.	Constituents of food – proteins, dietary sources, role and functional properties in food, contribution to organoleptic and textural characteristics.	Food processing and preservation by Sivasankar	52-81
4.	Constituents of food – water, dietary sources, role and functional properties in food, contribution to organoleptic and textural characteristics.	Food processing and preservation by Sivasankar	9-19
5.	Constituents of food – vitamins and minerals, dietary sources, role and functional properties in food, contribution to organoleptic and textural characteristics.	Food processing and preservation by Sivasankar	82-92
<b>UNIT II</b> <b>FOOD ADDITIVES (9)</b>			
6.	Classification, intentional and non-intentional additives, functional role in food processing and preservation;	Food processing and preservation by Sivasankar	107-119
7.	Food colourants – natural and artificial; food flavours;	Food processing and preservation by Sivasankar	93-106
8.	Enzymes as food processing aids.	Food processing and preservation by Sivasankar	67-80
<b>UNIT III</b> <b>MICROORGANISMS ASSOCIATED WITH FOOD (9)</b>			
9.	Bacteria, yeasts and molds – sources, types and species of importance in food processing and preservation;	Food processing and preservation by Sivasankar	120-132
10.	Fermented foods and food chemicals,	Food processing and preservation by Sivasankar	133-146
11.	Single cell protein.	Food processing and preservation by Sivasankar	140-142
<b>UNIT IV</b> <b>FOOD BORNE DISEASES (9)</b>			
12.	Classification – food infections – bacterial and other types; food intoxications and poisonings – bacterial and non-bacterial;	Food processing and preservation by Sivasankar	147-155

13.	Food spoilage – factors responsible for spoilage,	Food processing and preservation by Sivasankar	156-160
14.	Spoilage of vegetable, fruit, meat, poultry, beverage and other food products.	Food processing and preservation by Sivasankar	161-165
<b>UNIT V</b> <b>FOOD PRESERVATION (9)</b>			
15.	Principles involved in the use of sterilization, pasteurization and blanching, thermal death curves of microorganisms, canning;	Food processing and preservation by Sivasankar	201-230
16.	Frozen storage-freezing characteristics of foods, microbial activity at low temperatures, factors affecting quality of foods in frozen storage;	Food processing and preservation by Sivasankar	231-244
17.	Irradiation preservation of foods.	Food processing and preservation by Sivasankar	245-251

## UNIT I

### FOOD AND ENERGY (9)

Constituents of food – carbohydrates, lipids, proteins, water, vitamins and minerals, dietary sources, role and functional properties in food, contribution to organoleptic and textural characteristics.

#### PART-A

##### 1. What is food Technology?

Food Technology is the application and use of the basic Sciences and Engineering in the selection, preservation, Processing, Packaging and distribution of the food items.

##### 2. What are the classifications of carbohydrates?

Classification of Carbohydrates (i). Monosaccharide - Glucose and Fructose.  
(ii). Disaccharide – Sucrose and Maltose.  
(iii). Polysaccharides – Starch and Cellulose.

##### 3. Discuss the aim of the aims of food science and technology.

The main aims of food science and technology-

Make available wholesome, nutritious and appetizing food at economical rates.

Improve nutritive value and minimize loss of essential nutrients during processing and preservation.

Prevent food poisoning, contamination or adulteration. Develop new varieties of instant or convenient food.

Cater to the special dietary requirements of astronaut, patients, sports person etc.

##### 4. What is the nutritive value of food, explain with example?

Food may be defined as substances, which when eaten and absorbed by the body to maintained life and growth. The chemical components that perform these function are called nutrients. The components are carbohydrates, fats, proteins, minerals, vitamins and water. This number of nutrients present in food is called nutritive value of food. eg., Nutritious food such as milk contain a variety of nutrient and can fulfill all the requirement of the body.

##### 5. Explain food as a source of energy.

Energy is provided in the human body in the form of ATP by metabolic process involving the breakdown of food constituents. (Carbohydrates – 4 kcal/g, Protein – 4 kcal/g, Fat – 9 kcal/g)

##### 6. What are the types of food nutrition?

There are 6 types of nutrition have been identified. They are:

1. Carbohydrates 2. Fats 3. Proteins 4. minerals 5. Vitamins and 6. Water

##### 7. What are antioxidants?

Antioxidants: These are the substances used to prevent Oxidation of fats by molecular Oxygen and avoid rancidity.

Ex: Butylated hydroxyanisole, Butylated hydroxyl toluene, Propyl Gallate.

##### 8. What are vitamins?

Vitamins: These are Organic Chemicals, other than essential amino acids and fatty acids that must be supplied to an animal in small amounts to maintain health.

Classification: (i). Fat soluble Vitamins : A, D, C And K

(ii). Water Soluble: C and B.

### **9. What are the functions of food industry?**

Food Industry: Food industry is manufacturing place where food products are processed, packed and distributed.

Different divisions involved in Food Industry include, Raw material Procurement, Preservation of Raw material, Processing of Raw material, Packaging of finished product and distribution of the product.

Various functions of food industry are cleaning, Concentrating, Controlling, Disintegrating, Drying, Evaporation, Fermenting, Foaming, Heating/Cooling, materials handling, Mixing, Packaging, Pumping, separating and others.

### **10. What are the constituents of food?**

Main constituents of food are Carbohydrates, Proteins, fats, vitamins, minerals and water.

### **11. What are the properties of sugar?**

Properties of Sugars: (i). They are sweet. (ii) they are soluble in water and readily forms syrups. (iii). They form crystals when water is evaporated from their solutions (iv). They supply energy. (v). microorganisms readily ferment them. (vi). They prevent the growth of Microorganisms in high concentrating so they can be used as preservative. (vii). They darken in color or caramelize on heating (viii). Some of them combine with proteins to give dark colors known as browning (ix). They give body and mouth feels to solutions in addition to sweetness.

### **12. Compare the properties of sugar and starches?**

Properties of Sugars and Starches : Sugars: (i). They are sweet. (ii). They are soluble in water and readily forms syrups. (iii). They form crystals when water is evaporated from their solutions (iv). They supply energy. (v). microorganisms readily ferment them. (vi). They prevent the growth of Microorganisms in high concentrating so they can be used as preservative. (vii). They darken in color or caramelize on heating (viii). Some of them combine with proteins to give dark colors known as browning (ix). They give body and mouth feels to solutions in addition to sweetness

Properties of Starches: (i). They are not sweet. (ii). They are not readily soluble in cold water (iii). They form pastes and gels in hot water. (iv). They provide a reserve energy source in plants and supply energy in nutrition. (v). They occur in seeds and Tubers as characteristic starch granules.

### **13. Give one preparation method for proteins?**

Proteins: Proteins are made by linking individual amino acids together in long chains which are essential to all life.

Peptide Bond: The bond formed between amino group of one amino acid with the Carboxylic group of other amino acid by the elimination of one water molecule is called Peptide bond.

### **14. What are fats?**

Fats are smooth, Greasy substances that are insoluble in water. Fat is mainly a fuel source for the animal or plant in which it is found or for the animal that eats it. It contains about 2and quarter times the calories found in an equal dry weight of protein or carbohydrate.

### **15. What are natural emulsions?**

Natural emulsions: Materials that keep fat globules dispersed in water or water globules dispersed in fat are emulsifiers. Natural emulsifiers are those, which are readily available in different systems. Ex: Lecithin a polyphospholipid found in egg yolk.

### **16. What are Natural Toxicants?**

These are the substances that plants do have to protect itself or help ensure reproduction, but toxic to human system. Heat of cooking destroys natural toxicants, Fermentation; Water soaking are other general methods of removing natural toxicants.



**17. How do the Energy is measured in terms of Kilocalories?**

A Calorie is the amount of heat required to raise the temperature of one gram of water by one degree Celsius.

**18. How do you measure the energy of food components?**

Total energy of the food components are measured by analyzing the food and determining the various constituents like Carbohydrates, fats, protein and water.

**19. What is protein efficiency ratio?**

The total weight gain of an experimental animal per gram of protein eaten is known as protein efficiency ratio. The product of Biological value and digestibility is called as net protein Utilization.

**20. What are the sources of vitaminA and VitaminB?**

Sources of Vitamin A: Meat, Milk, Eggs, and the like.

Vitamin B: Formed in the skin by activation of Steroids by Ultraviolet light from the sun..

**21. What are the deficiency of vitamin K and C?**

Effects of Deficiency of Vitamin K : Affects normal blood clotting. Its deficiency generally parallels liver diseases where fat absorption is abnormal.

Vitamin C : Its deficiency causes Fragile Capillary walls. Easy bleeding of gums, loosening of teeth, and bone joint diseases.

**22. How is water activity determined ?(May 2011,May 2013)**

Water activity values are obtained by either a capacitance or a dew point hygrometer.

**23. Define retrogradation? (May 2011)**

Retrogradation is a reaction that takes place in gelatinized starch when the amylose and amylopectin chains realign themselves, causing the liquid to gel

**24. What are the three main types of lipids?**

Simple lipids, compound lipids and derived lipids

**25. What is basal metabolic rate? (May 2012)**

Energy required to maintain the body at complete rest.

**26. Define dietary fibre (May 2012, Nov 2014)**

Dietary fiber or sometimes roughage and ruffage is the indigestible portion of food derived from plants.

**27. Differentiate water soluble and insoluble protein(May 2013, May 2014)**

Dietary fiber consists of the indigestible parts of plant foods. As you note, there are two kinds. Soluble fiber dissolves in water; insoluble does not. Both are important for healthy digestion, and both can help prevent heart disease, obesity, diabetes, diverticulitis (an intestinal malady) and constipation.

**28. What is glycemic carbohydrate (Nov 2014)**

The **glycaemic index (GI)** measures **carbohydrates** according to how quickly they are absorbed and raise the glucose level of the blood. A low **GI** diet may help a person with diabetes control their blood glucose levels. It may also help energy levels for endurance sports.

**29. What are the functional properties of carbohydrates in food? (Dec2016)**

- Help cause the colour change of bread, toast and bakery products;
- Contribute to the chewiness, colour and sweet flavour of caramel;
- Thicken products such as sauces and custards.

**30. List out the organoleptic properties of food. (Dec2016)**

Organoleptic properties are the aspects of food, water or other substances that an individual experiences via the senses—including taste, sight, smell, and touch.

## **PART-B**

- 1. Give detailed account on the nutritional characteristics of carbohydrates. (May 2008, May 2012, May 2013, May 2014)**

Food processing and preservation by Sivasankar – 20-38

- 2. How are vitamins classified? List the vitamins under each class. (May 2008, May 2012, May 2014, Nov 2014)**

Food processing and preservation by Sivasankar – 89-92

- 3. Write a note on the different types of bound water in foods and their role in chemical and enzymatic reactions during processing? (Dec 2010) How is moisture content of food determined?**

Food processing and preservation by Sivasankar -9-19

- 4. Discuss in detail the role of protein.**

Food processing and preservation by Sivasankar – 52-81

- 5. Discuss the functional properties of food and role of carbohydrate, protein, lipid and vitamins in contributing textural characteristics. (Nov 2014)**

Food processing and preservation by Sivasankar – 20-38; 52-81; 39-51; 82-92

- 6. Give a detailed account on different classification and biological requirements of proteins (May 2013)**

Food processing and preservation by Sivasankar – 52-81

## **PART-C**

- 1. Write a detail account on the role of minerals and their functions in human metabolism. (Dec 2016)**

Food processing and preservation by Sivasankar – 20-38

- 2. Discuss in detail about the role of carbohydrates in flavour and color production. (Dec 2016)**

Food processing and preservation by Sivasankar – 20-38

- 3. Elaborate the functional properties of food and role of carbohydrate, protein, lipid and vitamins in contributing textural characteristics. (Nov 2014)**

Food processing and preservation by Sivasankar – 20-38; 52-81; 39-51; 82-92

## UNIT II

### FOOD ADDITIVES (9)

Classification, intentional and non-intentional additives, functional role in food processing and preservation; food colourants – natural and artificial; food flavours; enzymes as food processing aids.

#### PART-A

**1. Define Food additives. (May/June 2012)**

Food additives are non-nutritive substances added intentionally to food generally in small quantities to improve its appearances, flavor, Texture or storage properties.

**2. What are Food preservatives?**

These are food additives added to food to protect it against the action of microorganisms.

Ex: Sodium Benzoate, Calcium Propionate.

**3. What are Enzymes?**

These are Biological catalysts that promote the widest variety of biochemical reactions.

Ex: Amylase, Pepsin.

**4. Explain flavor enhancers.**

Flavour enhancers such as inosine 5 –monophosphate and guanosine monophosphate can be produced by degradation of RNA with 5-phosphodiesterase. RNA is a byproduct of plant processing as single cell protein production.

**5. Classify the flavour and color reactions of carbohydrate constituents of food?**

The flavour and color reactions of carbohydrate constituents of food may be classified into

- (i) Enzymic browning reactions
- (ii) Caramelization
- (iii) Mallard reaction
- (iv) Strecker degradation

**6. What are the two types of Browning reactions?**

The browning reactions that occur in foods may be classified into two types:

- (1) Oxidative browning
- (2) Non – oxidative browning

**7. Name some of the artificial colourants.**

Amarnath, Ponceau 4R, yellow FCF, tartrazine and triarylmethane dyes, Xanthenes and indigo dyes,

**8. What are the types of Carotenoids?**

Carotenoids are pigments responsible for yellow and orange colour of fruits and vegetables. Chemically they are classified as terpenoids and steroids. The Carotenoids are of two groups, carotenes, which are hydrocarbons and xanthophylls which contain oxygen.

**9. Write notes on Melanins?**

Melanins are formed in vegetables and fruits such as apples and bananas, as a brown colour when the plant tissues are damaged or cut portions are exposed to air. The browning is due to polyphenolic substances of melanin type pigments produced by the action of the enzyme phenolase present naturally.

**10. List out some of the natural colourants. (May 2013)**

Natural pigments such as  $\beta$  – carotene and the beet pigments are extracted from natural sources. Curcumin is the yellow pigment in the spice turmeric is used in colouring baked

foods such as cakes and also in ice-creams. Cochineal is a group of red pigments from various dead female insects used in the form of dried powder.

**11. What is called Flavour?**

Flavour is a collection of sensory phenomena which includes taste, aroma, texture or mouth feel as detected by different sensory organs.

**12. Name some of the acids responsible for sourness in foods.**

Sourness is always assumed to be a property of acidic solutions. Citric acid, tartaric acid, malic acid, acetic acid and oxalic acid are responsible for the acidity and sourness.

**13. Why food additives are added to the foods?**

The use of food additives is justified when it serves at least one of the following

(a) maintenance of nutritional quality, (b) enhancement of keeping quality or storage stability with reduction in food loss, (c) making the food attractive and acceptable to the consumer, (d) as essential aids in food processing.

**14. What is called food preservatives?**

Preservatives are used to prevent the microbiological spoilage, chemical deterioration and to control the insects and rodents.

**15. What is the function of EDTA and citric acid?**

EDTA and citric acid are used as chelating agents. Citric acid is used as preservative and to suppress browning of fruits and vegetables and as an aroma improver in processed cheese and buttermilk.

**16. Give examples for acids used as food additives.**

Lactic acid and acetic acid are used to induce coagulation of milk in manufacture of cheese.

Benzoic acid and sorbic acid function as antimicrobial agents. Fumaric acid increases the shelf life of dehydrated foods such as pudding and jelly powders.

**17. Why bases are added as food additive?**

Bases are added during food processing mainly to maintain pH, carbon dioxide evolution, and enhancement of colour and flavor and also for the chemical peeling of skins of vegetables.

**18. What are surface active agents? (May 2013)**

Surface active agents are emulsifiers used to stabilize oil-in-water and water-in-oil mixtures, gas-in-liquid mixtures and gas-in-liquid mixtures. These include emulsifiers such as lecithin, synthetic mono- and diglycerides and their derivatives.

**19. What are anticaking agents?**

Anticaking agents are added to maintain the free-flowing nature of granular and powdered food materials which are normally hygroscopic. These additives function by absorbing excess moisture present in the food and coating the food particles to provide a water-repelling characteristic. Eg., Calcium silicate used in baking powder and calcium stearate also functions as lubricant in the manufacture of tablets from candies.

**20. What is the purpose of using of wood smoke?**

The smoking of foods is practiced mainly for two purposes: adding desired flavour and preserving food. The smoking process helps preservation by impregnating the food near its surface with chemical preservatives from the smoke.

**21. What are pyroligneous acids? (May 2011)**

Pyroligneous acid, also called wood vinegar, is a dark liquid produced through the natural act of carbonization, which occurs when wood is heated in an airless container during charcoal production.

**22. What factors determine the odour threshold value of aroma compounds? (May 2011)**

An aroma compound, also known as odorant, aroma, fragrance or flavor, is a chemical compound that has a smell or odor. A chemical compound has a smell or odor when two

conditions are met: the compound needs to be volatile, so it can be transported to the olfactory system in the upper part of the nose, and it needs to be in a sufficiently high concentration to be able to interact with one or more of the olfactory receptors.

**23. What is the reason for the characteristic porosity of breads and cakes? (May 2010)**

The presence of leavening agents determines the porosity.

**24. What are stabilizers and thickeners?**

In chemistry a stabilizer is a chemical which tends to inhibit the reaction between two or more other chemical. It can be thought of as the antonym to a catalyst. The term can also refer to a chemical that inhibits separation of suspensions, emulsions, and foams. Thickening agents, or thickeners, is the term applied to substances which increase the viscosity of a solution or liquid/solid mixture without substantially modifying its other properties.

**25. What is whey?**

Whey or Milk Serum is the liquid remaining after milk has been curdled and strained. It is a by-product of the manufacture of cheese or casein and has several commercial uses.

**26. Define Immobilized enzymes.(May/June 2012)**

An immobilized enzyme is an enzyme that is attached to an inert, insoluble material such as calcium alginate (produced by reacting a mixture of sodium alginate solution and enzyme solution with calcium chloride).

**27. What is the role of enzyme in food processing? (Dec 2016)**

Enzymes are proteins that act as catalysts in all living organisms - microorganisms, plants, animals, and humans. Catalysts are compounds that increase the rate of chemical reactions in biological systems. Rennet is an example of a natural enzyme mixture from the stomach of calves or other domestic animals that has been used in cheese making for centuries.

**28. What are the sensory perceptions of flavour? (Dec 2016)**

Taste buds in tongue, olfactory, visual and thermal becomes the sensory perceptions of flavour

**29. What are the ways by which the flavour is developed?**

The interest in developing natural food flavours has paved way for biotechnological processes. Two broad strategies are adopted for flavour development in foods. Microorganisms or enzymes are used to generate flavouring complexes or multi-component flavour systems as practiced in the production of dairy products. Alternatively, biosynthesis may be facilitated to develop single-flavour compounds.

**30. Why is food smoking preferred?**

The smoking of foods is practiced mainly for two purposes: adding desired flavour and preserving food.

## **PART-B**

- 1. Classify the different additives used in food industry, giving one example for each class. (May 2008, May 2013, May 2014, Nov 2014)**  
Food processing and preservation by Sivasankar – 107-119
- 2. Write notes on the use of enzymes as processing aids (May 2014)**  
Food processing and preservation by Sivasankar – 67-81
- 3. What are the functional characteristics of chemical additives? Classify the different additives used in food industry, giving one example for each class (Dec 2010)**  
Food processing and preservation by Sivasankar – 108-119
- 4. How are enzymes useful as processing aids in confectionary and edible oil industry? (May 2013)**  
Food processing and preservation by Sivasankar – 67-81
- 5. How are gases, propellants and wood smoke used in food industry (May 2008)**  
Food processing and preservation by Sivasankar – 113-117
- 6. Explain about food colorants and flavors.**  
Food processing and preservation by Sivasankar – 93-106.

## **PART-C**

- 1. Explain in detail about the intentional additives with suitable examples. (Dec 2016)**  
Food processing and preservation by Sivasankar – 107-119
- 2. Write a detailed account on food colours with examples. (Dec 2016)**  
Food processing and preservation by Sivasankar – 93-106
- 3. Write notes on the use of enzymes as processing aids**  
Food processing and preservation by Sivasankar – 67-81

## UNIT III

### MICROORGANISMS ASSOCIATED WITH FOOD (9)

Bacteria, yeasts and molds – sources, types and species of importance in food processing and preservation; fermented foods and food chemicals, single cell protein.

#### PART-A

#### PART -A

**1. List some gram – negative bacteria associated with food?**

Gram –negative bacteria –Pseudomonas, Gluconobacter, Halobacteria, Acetobacter, Brucella, Escherichia, Salmonella, Shigella. Etc

**2. What are the primary sources of microorganism commonly associated with food?**

Primary source of microorganism commonly associated with food are

1. Soil, water and air
2. Plants and their products
3. Animals and human beings
4. Food handling equipments.

**3. What are proteolytic bacteria?**

Proteolytic bacteria include a heterogeneous group of bacteria, which produce extra cellular protease. The species include aerobis, facultative, spore forming organisms. Most species belongs to the genera of clostridium, bacillus, pseudomonas, and proteus.

**4. Give few importance of yeast in foods?(May 2012, May 2013)**

Saccharomyces species are the most widely used yeasts. S.cerevisiae is used in the manufacture of many food with special strains used for the leavening of bread and for the production of ale, wine, alcohol, glycerol and invertase.

**5. Name the extrinsic factors influencing microbial activity.**

The extrinsic factors influencing microbial activity includes – temperature, relative humidity of environment, gaseous atmosphere surrounding the food.

**6. Name two fermented food products.**

1. Cheese and 2. Curd.

**7. What is vinegar?**

Vinegar is defined as a condiment made from sugary or starchy materials by an alcoholic fermentation followed by an acetone. It contains at least 4 gram of acetic acid per 100 ml.

**8. What are the Advantages of Baking**

Development of Flavor (ii). On baking different colors forms due to presence of sucrose, fructose and glucose.

**9. What are the Classification of Bakery products?**

Yeast leavened; Chemically leavened; Partially leavened; air leavened.

**10. What are the five dairy products?**

Cheese, Ghee, Curd, Yogurt, and Butter.

**11. What is Chocolate Liquor?**

It is the liquor containing 55% fats, 17% Carbohydrates, 11% Proteins, 6% Tannin Compounds, 3% Ash, 2.5% Organic acids; 2% Moisture; traces of Caffeine and 1.5% thio bromine.

**12. What is Curing of meat?**

It refers to the modifications of meat that affects preservation flavor, color and tenderness due to added curing ingredient.

**13. Define Mashing**

This is the first step in beer making. The malted barley and cereal adjuncts are mixed with water and mildly cooked to extract readily soluble malts and to gelatinize starch.

Brewing: It is boiling the wort in a kettle for about 2.5 Hours. It concentrates the wort, nearly sterilizes it, inactivates enzymes, precipitates remaining protein that may contribute to the turbidity of beer.

**14. Explain the importance clarification of milk:**

It removes the impurities, sediments, body cells, and some bacteria from the udder.

**15. What is meant by Milk Homogenization**

Homogenization is the process of subdividing the fat globules and clumps to such small sizes that they will no longer rise to the top of the milk as a distinct layer in the time before milk is consumed. It makes the milk more uniform prevent cream from rising to the top of a container.

**16. What is Cheese**

It is the product made from the curd of the milk of cow and other animals.

Classification: It is classified six different classes, soft, semi soft, Hard, Very hard, Process cheese and whey cheese.

**17. Explain the steps involved in the canning of fish**

Thaw the partially frozen tuna received, eviscerate, clean and sort tuna for size, Precook whole tuna to soften flesh, cool overnight, separate the meat, filling and compaction of meat into cans, add salt and vegetable oil or water in cans, vacuum sealing and sterilize the can.

**18. What is the composition of egg**

Water: 65%; Protein: 12%, and fat: 17%.

**19. Explain the different ways of artificial meat Tenderizing**

Mechanical means, Use of low level of salt, which solubilizes meat protein, Addition of proteolytic enzyme, and electrical stimulation of carcasses.

**20. What is the importance of Scalding**

It is done to loosen the feathers of dead birds and facilitate easier plucking. It is done at 60° C for about 45 secs.

**21. List out any four foods involved in botulism(May 2011)**

String beans, sweet corn, beets, asparagus, spinach etc

**22. Give any four rots and their agents(May 2011)**

*Aspergillus sp*, *Penicillium expansum*-soft rot in fruits

*Helminthosporium sp*-rots in vegetables

*Sporotrichum*-white spot in chilled meat

*Cladosporium herbarum*-black spots in many food

**23. What is meant by heterolactic fermentation?**

A type of lactic acid fermentation by which small yields of lactic acid are produced and much of the sugar is converted to carbon dioxide and other products.

**24. Give two examples of organisms responsible for the spoilage of sucrose**

*Leuconostoc* and *bacilli*

**25. Name any two fungi used for the commercial production of amylase**

*Aspergillus oryzae*, *Rhizopus delemar*

**26. What is sauerkraut? Enlist the microorganisms involved.(May 2014)**

**Sauerkraut** is finely cut cabbage that has been fermented by various lactic acid bacteria, including *Leuconostoc*, *Lactobacillus*, and *Pediococcus*



**27. What is SCP (May 2014, Nov 2014)**

**Single-cell protein (SCP)** typically refers to sources of mixed protein extracted from pure or mixed cultures of algae, yeasts, fungi or bacteria (grown on agricultural wastes) used as a substitute for protein-rich foods, in human and animal feeds.

**28. What is lactic acid fermentation (Nov 2014)**

Lactic acid fermentation is a biological process by which glucose and other six-carbon sugars (also, disaccharides of six-carbon sugars, e.g. sucrose or lactose) are converted into cellular energy and the metabolite lactate.

**29. What are the sensory perceptions of flavour? (Dec 2016)**

Taste buds in tongue, olfactory, visual and thermal becomes the sensory perceptions of flavour

**30. Give few importances of bacteria in foods. (Dec 2016)**

Fermentation

Production of food chemicals

Production of cheese etc.

Meat tenderization

**PART-B**

**1. Describe in detail the steps involved in food fermentation.(Dec 2010)**

Food processing and preservation by Sivasankar – 133-134

**2. Give a flow chart for the manufacture of HFCS. Discuss the commercial importance of HFCS and elaborate the process.**

Food processing and preservation by Sivasankar – 332-334

**3. Describe in detail the production of Single Cell Protein for use as food?**

Food processing and preservation by Sivasankar – 140-142

**4. Discuss in detail about the food chemicals.(Dec 2010)**

Food processing and preservation by Sivasankar – 133-146

**5. What are SCPs? Describe in detail the production of mycoprotein for use as food (May 2008, May 2012)**

Food processing and preservation by Sivasankar – 140-142

**6. Write about factors influencing the microbial activity?(May 2008,May 2011,May 2012,May 2013)**

Food processing and preservation by Sivasankar –123-128

**PART-C**

**7. a) Give a detailed account on the factors influencing microbial activity. (Dec 2016)**

Food processing and preservation by Sivasankar –123-128

**8. Write a detailed account on food chemicals with suitable examples. (Dec2016)**

Food processing and preservation by Sivasankar – 133-146

**9. Discuss about the production of HFCS.**

Food processing and preservation by Sivasankar – 332-334

## UNIT IV

### FOOD BORNE DISEASES (9)

Classification – food infections – bacterial and other types; food intoxications and poisonings – bacterial and non-bacterial; food spoilage – factors responsible for spoilage, spoilage of vegetable, fruit, meat, poultry, beverage and other food products.

#### PART-A

##### 1. What is food spoilage?

Food is mostly subjected to physical, chemical and biological changes and this cause the deterioration in the quality and ultimately the spoilage of food. The major causes of food spoilage include 1.microorganisms,their growth and activity,2.action of native enzymes,3.insects,rodents and parasites,4.chemical reaction of constituents of food, 5.environmental factors such as temperature ,moisture, air and light and 6.time

##### 2. Name the organisms, which are responsible for food spoilage.(May 2013,Nov 2014)

*Eruinia carotovoa* and *Pseudomonas* etc – spoilage of vegetables

*Rhizopus stolonifer* - spoilage of bakery or bread

*Streptococcus* ,*Leuconostoc*,*Lactobacillus*,*Pseudomonas*,*Bacillus*,*Mycobacterium perfringes* etc – Spoilage of dairy products.

*Clostridium perfringens* etc – spoilage of meat

*Acetobacter*,*lactobacillus* etc – spoilage of alcoholic beverages.

##### 3. What is tenderization of meat?

Tenderization of meat is a meat softening process in which cross linkages between muscle fibres are caused. Meat is tenderized by mechanical method, use of ultrasonic vibrations,by enzymes such as papain and bromelain.

##### 4. Why spoilage of fish occurs rapidly, give reason?

Fish are aquatic animals and contain several microbes at the top of the surface.therefore fish undergo decomposition and spoilage readily and rapidly even temperature close to 0°C.Hence they are cooled or frozen or dried ,smoked is followed by pickling in vinegar or gelatin.

##### 5. What is outbreak of disease?

The occurrence of a large number of cases of disease in a short period of time is called outbreak. Eg.,Food borne disease outbreak after ingestion of infected common food.

##### 6. What is Amoebiasis?

Amoebiasis is a disease leads to diarrhea caused by *Entamoeba histolytica* by use of sewage-contaminated water.

##### 7. What do you understand by the term posing capacity of food with respect to O-R potential?

Processing of foods alters the poisoning power of foods by destroying or altering the reducing or oxidizing substances and also may allow more diffusion of oxygen.

##### 8. Define enterotoxin.

Enterotoxin caused enterotoxiquinic illness produced by the enteropathogenic *E.coli* is implicated in human diarrhea disease as food poisoning.

##### 9. What is shigellosis?

Shigellosis is the illness of bacillary dysentery caused by ingestion of moist foods such as milk , potato,apple contaminated by shiquila.

##### 10. Define Alfatoxins?

Alfatoxins – A toxin chemical produced by fungi, *Aspergillus liavus*, *parasitteus*, and other organisms. Alfatoxins are toxic or carcinogenic to fish, mammals and poultry

contamination of formulated food products can occur in large scale or outbreaks in food poisoning.

**11. What is Mycotoxin?**

Mycotoxins (fungal toxins) – are fungal metabolites, some of which are toxic to many animal and human. Fungi include – molds, yeast, mildews, rusts, mushrooms and blight. Eg., *Penicillium* and *Aspergillus* are known to produce mycotoxins.

**12. Classify the various foods on the basis of their ease of spoilage.**

Vegetables and fruits, Cereals and products, Bakery products, Dairy products, Nutmeals, Meat, poultry, sea foods, eggs, spices, salad dressings, sugar and confectionary items and alcoholic beverages

**13. Explain chemical toxin/ poisoning**

Food poisoning due to chemicals in the food is usually characterized by appearance of the symptoms within a short time after eating the poisoned food. Arsenic, antimony, cadmium, chlorinated hydrocarbons, copper cyanide, fluoride, zinc and nicotinic acid may enter foods from utensils processing equipment, pesticide or insecticide spray residues on vegetables and fruits, from improper packaging materials or added accidentally in place of normal additives.

**14. What is botulism?( May 2012)**

The disease is caused by the ingestion of food containing the neurotoxin produced by 7 types of *Clostridium botulism* (A, B, C, D, E and G) have been identified on the basis of the geological specificity of the toxins produced by the organisms. Toxins produced by types A, B, E and type F have been identified to cause botulism. The organism required glucose or maltose for toxin production.

**15. What are food infections?(May 2014)**

Food infection caused by entry of pathogenic and parasites into body and the reaction of the body by consuming foods contaminated with organism – by food chain.

**16. Write a few microorganisms, which cause spoilage of food.**

Four different spoilage patterns are – common for alcoholic beverages are

- Rapiness – caused by *Acetobacter*
- Sourness – caused by *Acetobacter*
- Turbidity - *Zymomonas* and *Saccharomyces* sp.

**17. Write a few microorganisms, which cause spoilage of bread.**

Bread – *Rhizopus stolonifer* is the common bread mold causing the spoilage known as rapiness in bread, particularly bread stored in high humidity or in bread wrapped while still warm.

**18. List out major sources of bacterial contamination of milk.**

External body of Animal (skin), Milk handling equipments, milking process.

**19. What is called patulin?**

Patulin produced by several molds such as *Penicillium expansum*, *P.claviforme*, *P.patulum*, *Aspergillus clavatus*, *A.terreus*, etc was first isolated as an antibiotic as it is effective against many bacterial species. It exhibits strong fungistatic activity and is also toxic to seeds and seedlings of sugar beets, corn, wheat, peas and cucumber.

**20. Give some examples for mycotoxins.**

Luteoskyrin, Sterigmatocystin, penicillic acid, Roquefortine.

**21. Distinguish putridity and rancidity.(May 2011)**

Putridity is caused by *Pseudomonas putrefaciens* on the surface of butter producing organic acids, particularly isovaleric acid producing bad odours. Rancidity occurs due to hydrolysis of butter fat resulting in the formation of free fatty acids.

**22. What are the microbes involved in yoghurt production(May 2011)**

*Streptococcus thermophilus* and *Lactobacillus bulgaris*

**23. What are the organisms responsible for spoilage of dairy products( May 2009)**

Lactic streptococci,coliform bacteria,like micrococci, enterococci,bacilli etc

**24. What is the significance of *Leuconostoc mesenteroides*?**

*Leuconostoc mesenteroides* is a species of bacteria associated with fermentation, under conditions of salinity and low temperatures.

**25. What are aflatoxins?**

Aflatoxins are naturally occurring mycotoxins that are produced by many species of *Aspergillus*, a fungus, the most notable ones being *Aspergillus flavus* and *Aspergillus parasiticus*.

**26. What is food intoxication (May 2013,May 2014)**

**Foodborne illness** (also **foodborne disease** and colloquially referred to as **food poisoning** is any illness resulting from the consumption of contaminated food, pathogenic bacteria, viruses, or parasites that contaminate food,as well as chemical or natural toxins such as poisonous mushrooms.

**27. List out any four foods involved in botulism(May 2011)**

String beans,sweet corn,beets,asparagus,spinach etc

**28. Give any four rots and their agents(May 2011)**

*Aspergillus sp*, *Penicillium expansum*-soft rot in fruits

*Helminthosporium sp*- rots in vegetables

*Sporotrichum*-white spot in chilled meat

*Cladosporium herbarum*-black spots in many foods

**29. What is food poisoning and what causes ciguatera poisoning(Nov2014)**

Food poisoning is defined as any disease of an infectious or toxic nature caused by the consumption of food or drink. The term is most often used to describe the illness, usually diarrhea, vomiting etc caused by bacteria, viruses , parasites or chemicals.

**Ciguatera** is a foodborne illness caused by eating certain reef fish whose flesh is contaminated with toxins originally produced by dinoflagellates such as *Gambierdiscus toxicus* which live in tropical and subtropical waters. These dinoflagellates adhere to coral, algae and seaweed, where they are eaten by herbivorous fish which in turn are eaten by larger carnivorous fish. In this way the toxins move up the food chain and biomagnify.

**30. What is botulism? (Dec 2016)**

Botulism is a rare and potentially fatal illness caused by a toxin, produced by the bacterium *Clostridium botulinum*. The disease begins with weakness, trouble seeing, feeling tired, and trouble speaking. This may then be followed by weakness of the arms, chest muscles, and legs. The disease does not usually affect consciousness or cause a fever. The disease is caused by the ingestion of food containing the neurotoxin produced by 7 types of *Clostridium botulinum* (*A, B, C, D, E and G*) have been identified on the basis of the geographical specificity of the toxins produced by the organisms. Toxins produced by types A,B, E and type F have been identified to cause botulism. The organism required glucose or maltose for toxin production.

## **PART-B**

- 1. Discuss in detail the role of various factors in the spoilage of foods.(Dec 2010, May 2012,May 2014)**

Food processing and preservation by Sivasankar – 157-160

- 2. Discuss the spoilage of meats and the factors that influence the growth of microorganism and the kind of spoilage.(May 2013, Nov 2014)**

Food processing and preservation by Sivasankar – 163

- 3. Discuss the spoilage of vegetables and fruits and the factors that influence the growth of microorganism and the kind of spoilage, illness associated with it .(May 2013, Nov 2014)**

Food processing and preservation by Sivasankar – 161

- 4. Discuss the spoilage of beverages and the factors that influence the growth of microorganism and the kind of spoilage.**

Food processing and preservation by Sivasankar – 165

- 5. Explain in detail about Food intoxication process and its avoidance ( Dec 2010, May 2014)**

Food processing and preservation by Sivasankar – 150-155

- 6. Discuss about food borne disease.**

Food processing and preservation by Sivasankar – 147- 150

- 7. Discuss in detail the spoilage of**

- i) Vegetables and fruits**
- ii) Bakery products**
- iii) Meat and meat products**
- iv) Dairy products (May 2008)**

Food processing and preservation by Sivasankar – 161-165

## **PART-B**

- 8. a) Explain food borne diseases with suitable examples. (Dec 2016)**

Food processing and preservation by Sivasankar – 147- 150

- 9. Explain the spoilage of meat, poultry and seafoods with examples. (Dec 2016)**

Food processing and preservation by Sivasankar – 161-165

- 10. Explain about the factors responsible for spoilage food.**

Food processing and preservation by Sivasankar – 157-160

## UNIT V

### FOOD PRESERVATION (9)

Principles involved in the use of sterilization, pasteurization and blanching, thermal death curves of microorganisms, canning; frozen storage-freezing characteristics of foods, microbial activity at low temperatures, factors affecting quality of foods in frozen storage; irradiation preservation of foods.

#### PART-A

**1. What is the unit operations involved in food technology?**

Unit operations meant for preserving food: Cooling/Heating, Evaporation, Drying, Packaging.

**2. What are the causes for food deterioration?**

Causes responsible for food deterioration: (i). Action of microorganisms like Bacteria, Yeasts and molds. (ii). Activities of the natural food enzymes. (iii). Insects, parasites and Rodents. (iv). Temperature. (v). Moisture and Drying (vi). Air – Oxygen (vii). Light. (v). Time.

**3. What is the role of shelf life in food preservation?**

Food preservation is very important with respect to increase of shelf life as well to improve quality of the food in few cases.

**4. Give one method of preservation.**

Smoking is a method of preservation. Smoke contains preservative chemicals such as Formaldehyde and other materials from the burning of wood.

**5. What is material handling operation?**

Materials handling operation includes hand and mechanical harvesting on the farm, refrigerated trucking of perishable produce, Transportation, Pneumatic conveying etc. It is very important in the sense; quality of raw material procurement is possible with effective materials handling operation.

**6. How do you remove contaminants from food?**

Cleaning is accomplished by brushes high velocity air, steam, water, vacuum magnetic attraction of metal contaminants and so on depending upon the product and the nature of dirt.

**7. What is the method available for separation of salt from sea water?**

Separation of salt from seawater: Pumping; Evaporation; solid packing etc.

**8. What are the different types of pumps used in food industries?**

Different types of pumps used in food industries: Cam and Piston pump, Gear pump, Lobe pump, Screw pump, Vane pump, Block pump.

**9. What are the Methods of heating?**

Foods are heated by conduction, convection, or a combination of these. Heating is done in food container by (i). Retorts. (ii). Ohmic heating (iii). Hydrostatic Cooker (iv). Microwave heating (f). Sterilization, pasteurization and Blanching.

**10. What are the methods of cooling?**

Methods of Cooling: Refrigeration, Freezing.

**11. What are the applications of drying?**

Drying eliminates biological degradation and increased the shelf life.

**12. What is meant by packing?**

Packaging, is an essential part of processing and distributing foods, Packaging essentially preserves the food.

**13. List out some insects causes destruction?**

Insects open the cereal grain to bacterial, Yeast, and mold infection causing further destruction. Cysts of various parasites cause severe disease if consumed. Rodents consume food and also contaminate food with filth.

**14. What is the role of biochemical catalyst?**

Natural food enzymes are biochemical catalyst. Unless these enzymes are inactivated, they continue to catalyze chemical reaction within foods. This reduces the shelf life of the foods.

**15. What is the role of acid in food preservation?**

Acid can be used as a food preservative as an acid of sufficient strength modifies bacterial proteins.

**16. What is the role of light in food?**

Light destroys some vitamins, notably riboflavin, Vitamin A and C, and causes deterioration of many food colors.

**17. What is Sterilization? (May 2012)**

It is a Heat Treatment that aims at complete elimination of microorganisms at 121° C with time duration of not less than 15 minutes.

**18. What is the condition for whole egg Pasteurization? (May 2011,May 2012)**

It is a low order heat treatment, generally below the boiling point of water aims at eliminating pathogenic microorganisms that are associated with food to extend the shelf life.

**19. What is HTST process?(May 2013)**

It is a high temperature process maintained for short duration in order to maintain the nutrient structures of the food intact. This process involves heating every particles of the foodstuff to at least 72°C and holding for not less than 15 Sec.

**20. What are Aseptic Canning?**

It is method in which food is sterilized usually in a continuous process and aseptically placed in previously sterilized containers, which are subsequently sealed in an aseptic environment.

**21. What are the Recent trends in Food Packaging?**

Micro wave packaging, High barrier plastic bottles, Aseptic packaging in composite carton, Military food packaging.

**22. What is blanching? (May 2014)**

Blanching is a kind of heat treatment given to the fruits and vegetables primarily to inactivate natural food enzymes. This is to be done before freezing since frozen storage itself would not completely arrest enzyme activity.

**23. What are the types of cold preservation?**

Types of cold preservation: Refrigeration and Freezing.

**24. What is the role of Refrigeration in food preservation?**

It is the gentlest method of food preservation, which refers to storage at temperature above freezing form about 4.5° - 7°C.

**Freezing:** It refers to storage at temperature of -18°C or below. It will preserve food for months or years of properly packed.

**25. What is the role of heat on food materials?**

Food materials that can be preserved by heat : Ripe Olives, Milk, Meat, Vegetables.

**26. What type of foods are preserved by heat?**

Food materials that can be preserved by heat: (i). Meat (ii). Fish (iii). Poultry (iv). Dry fruits (v). Vegetables or fruits (vi).Milk and its product.

**27. What are the methods available for preserving fruit?**

Fruit Juices can be preserved by adding Preservatives or by Pasteurizing to the required temperature to decrease microbial growth and to inactivate natural enzymes.

**28. What is the Role of radiations with respect to food preservation?**

X-Rays, Microwaves, UV light, and ionizing radiation are each type of electromagnetic radiation, which is used to preserve food. The effectiveness of each type differs and each imparts different changes in food.

**29. What is logarithmic order of death?**

Bacteria are killed by heat at a rate that is very nearly proportional to the number present in the system being heated. This is referred to as logarithmic order of death.

**30. What is D value and F value?**

D-Value: It is defined as the time in minutes at a specified temperature required to destroy 90% of the organisms in a population.

F-Value: The F Value is defined as the number of minutes at a specific temperature required to destroy a specified number of organisms having a specific Z value. ( Z-Value is the number of degree required for a specific thermal death time curve to pass thorough one log cycle that is change by a factor of 10)

**31. What is cold point?**

The point in a can or mass of food, which is last to reach the final heating temperature, is designated the Cold point.

**32. What is cold sterilization? (Nov 2014)**

Cold sterilization is the use of ionizing radiations for preservation having high penetrating power but do not produce radioactivity in treated food. They also do not produce significant heat in food. Hence, known as cold Sterilization.

**33. What is radurization (May 2012)**

The dose of radiation used on food products is divided into three levels. Radappertization is a dose in the range of 20 to 30 kilograys, necessary to sterilize a food product. Radurization is a dose of 1 to 10 kilograys, that, like pasteurization, is useful for targeting specific pathogens. Radicidation involves doses of less than 1 kilogray for extending shelf life and inhibiting sprouting.

**34. Define pasteurization (May 2014)**

Pasteurization is the exposure of food like milk, cheese, yogurt, beer, or wine to an elevated temperature for a period of time sufficient to destroy certain microorganisms, as those that can produce disease or cause spoilage or undesirable fermentation of food, without radically altering taste or quality.

**35. Define cryogenic freezing (Nov 2014)**

**Cryopreservation or cryoconservation** is a process where cells, whole tissues, or any other substances susceptible to damage caused by chemical reactivity or time are preserved by cooling to sub-zero temperatures. At low enough temperatures, any enzymatic or chemical activity which might cause damage to the material in question is effectively stopped.

**36. What are the principles of food preservation? (Dec 2016)**

Heating, Blanching Sterilization pasteurization etc

**37. Define blanching in food processing. (Dec 2016)**

Blanching is a kind of heat treatment given to the fruits and vegetables primarily to inactivate natural food enzymes. This is to be done before freezing since frozen storage itself would not completely arrest enzyme activity.



## **PART-B**

- 1. Give a detailed account on Low temperature food preservation methods (Dec 2010).**  
Food processing and preservation by Sivasankar – 231-244
- 2. Describe the commercial heat preservation method. (Dec 2010, May 2014)**  
Food processing and preservation by Sivasankar – 201-215; 216-230
- 3. State and explain different factors involved in Refrigerated and Frozen food preservation (May 2014, Nov 2014)**  
Food processing and preservation by Sivasankar – 232-242
- 4. Discuss in detail the principles of thermal destruction of microorganisms explaining the term D value (May 2011)**  
Food processing and preservation by Sivasankar – 205-210
- 5. What are ionizing radiations? What is the effect of low temperatures and freezing on the constituents of foods? (May/June 2012, May 2013)**  
Food processing and preservation by Sivasankar – 245-251
- 6. Write note on (Nov 2014)**
  - a) Thermal death time
  - b) Blanching
  - c) Canning
  - d) IrradiationFood processing and preservation by Sivasankar – 201-251

## **PART-C**

- 7. Explain the use of high temperatures for food preservation and list out the factors affecting the heat resistance of microorganisms. (Dec 2016)**  
Food processing and preservation by Sivasankar – 201-215; 216-230
- 8. Write a detailed account on canning and steps involving in aseptic canning. (Dec 2016)**  
Food processing and preservation by Sivasankar – 213-214
- 9. Give a detailed account on Low temperature food preservation methods (Dec 2010).**  
Food processing and preservation by Sivasankar – 231-244

**Part-A**

**1. What are the functional properties of carbohydrates in food?**

- Help cause the colour change of bread, toast and bakery products;
- Contribute to the chewiness, colour and sweet flavour of caramel;
- Thicken products such as sauces and custards.

**2. List out the organoleptic properties of food.**

Organoleptic properties are the aspects of food, water or other substances that an individual experiences via the senses—including taste, sight, smell, and touch.

**3. What is the role of enzyme in food processing?**

Enzymes are proteins that act as catalysts in all living organisms - microorganisms, plants, animals, and humans. Catalysts are compounds that increase the rate of chemical reactions in biological systems. Rennet is an example of a natural enzyme mixture from the stomach of calves or other domestic animals that has been used in cheese making for centuries.

**4. What are the sensory perceptions of flavour?**

Taste buds in tongue, olfactory, visual and thermal becomes the sensory perceptions of flavour

**5. Give few importances of bacteria in foods.**

Fermentation  
Production of food chemicals  
Production of cheese etc.  
Meat tenderization

**6. What are fermented foods?**

**Sauerkraut** is finely cut cabbage that has been fermented by various lactic acid bacteria, including *Leuconostoc*, *Lactobacillus*, and *Pediococcus*

**7. Classify food infection.**

It is of two types

1. Contaminated food does not support growth of the organism it carries them.
2. Food serve as a medium for the growth of the organism

**8. What is botulism?**

Botulism is a rare and potentially fatal illness caused by a toxin, produced by the bacterium *Clostridium botulinum*. The disease begins with weakness, trouble seeing, feeling tired, and trouble speaking. This may then be followed by weakness of the arms, chest muscles, and legs. The disease does not usually affect consciousness or cause a fever. The disease is caused by the ingestion of food containing the neurotoxin produced by 7 types of *Clostridium botulinum* (A, B, C, D, E and G) have been identified on the basis of the geological specificity of the toxins produced by the organisms. Toxins produced by types A, B, E and type F have been

identified to cause botulism. The organism required glucose or maltose for toxin production.

**9. What are the principles of food preservation?**

Heating, Blanching Sterilization pasteurization etc

**10. Define blanching in food processing.**

Blanching is a kind of heat treatment given to the fruits and vegetables primarily to inactivate natural food enzymes. This is to be done before freezing since frozen storage itself would not completely arrest enzyme activity.

**Part - B**

**11. a) Write a detail account on the role of minerals and their functions in human metabolism.**

Food processing and preservation by Sivasankar – 20-38

**(OR)**

**b) Discuss in detail about the role of carbohydrates in flavour and color production.**

Food processing and preservation by Sivasankar – 20-38

**12. a) Explain in detail about the intentional additives with suitable examples.**

Food processing and preservation by Sivasankar – 107-119

**(OR)**

**b) Write a detailed account on food colours with examples.**

Food processing and preservation by Sivasankar – 93-106

**13. a) Give a detailed account on the factors influencing microbial activity.**

Food processing and preservation by Sivasankar – 123-128

**(OR)**

**b) Write a detailed account on food chemicals with suitable examples.**

Food processing and preservation by Sivasankar – 133-146

**14. a) Explain food borne diseases with suitable examples.**

Food processing and preservation by Sivasankar – 147- 150

**(OR)**

**b) Explain the spoilage of meat, poultry and seafoods with examples.**

Food processing and preservation by Sivasankar – 161-165

**15. a) Explain the use of high temperatures for food preservation and list out the factors affecting the heat resistance of microorganisms.**

Food processing and preservation by Sivasankar – 201-215; 216-230

**(OR)**

**b) Write a detailed account on canning and steps involving in aseptic canning.**

Food processing and preservation by Sivasankar – 213-214

## Anna University Question Paper Nov/Dec 2017

### BT6003 – Principles of Food Processing

#### Part- A

**1. How will you classify carbohydrates?**

Classification of Carbohydrates (i). Monosaccharide - Glucose and Fructose.  
(ii). Disaccharide – Sucrose and Maltose.  
(iii). Polysaccharides – Starch and Cellulose.

**2. What are proteins?**

Proteins: Proteins are made by linking individual amino acids together in long chains which are essential to all life.

**3. Mention the significance of food additives.**

Food additives are non-nutritive substances added intentionally to food generally in small quantities to improve its appearances, flavor, Texture or storage properties.

**4. List out the enzymes used as food processing aids.**

Protease, lipase

**5. What are fermented foods?**

**Fermented foods** are **foods** produced or preserved by the action of microorganisms.

Ex. Cheese and Curd

**6. Define single cell protein.**

Protein derived from a culture of single-celled organisms and the organism itself serve as protein, used especially as a food supplement. Eg. Spirulina

**7. How do you classify food infections?**

Food infection caused by entry of pathogenic and parasites into body and the reaction of the body by consuming foods contaminated with organism – by food chain.

Bacterial infection, Viral infection, parasite infection

**8. What are the factors responsible for food infection?**

pH, Moisture content, no. Of microorganism present, temperature etc.

**9. Write the effect of low temperature on microbial activity.**

Decrease in temperature cause an exponential reduction of the reaction rate, and the magnitude of which depends on the value of the activation energy.

**10. State the freezing characteristics of foods.**

#### Part-B

**11. a) Explain in detail about the classification, characteristics and importance of vitamins and minerals.**

Food processing and preservation by Sivasankar – 82-92

(OR)

**b) Discuss in detail about the contribution of foods to organoleptic and textural characteristics.**

Food processing and preservation by Sivasankar – 20-38

**12. a) Write in detail about the food additives, intentional and non-intentional additives.**

Food processing and preservation by Sivasankar – 108-119

**(OR)**

**b) Describe in detail about the functional roles of food additives in food processing and preservation.**

Food processing and preservation by Sivasankar – 108-119

**13. a) Give a detailed note on sources, types and importance of species in food processing and preservation.**

Food processing and preservation by Sivasankar – 133-136

**(OR)**

**b) Write in detail about the importance of species in fermented foods and food chemicals.**

Food processing and preservation by Sivasankar – 133-146

**14. a) Discuss in detail about the spoilage of vegetables, fruit and poultry food products.**

Food processing and preservation by Sivasankar – 161-165

**(OR)**

**b) Explain in detail about the factors responsible for food spoilage, food intoxication and poisoning.**

Food processing and preservation by Sivasankar – 157-160

**15. a) Give a detailed note on pasteurization, blanching and thermal death curves of micro organism.**

Food processing and preservation by Sivasankar – 201-251

**(OR)**

**b) Describe in detail about the factors affecting the quality of foods in frozen storages and irradiation preservation of foods.**

Food processing and preservation by Sivasankar – 231-244

#### **Part-C**

**16. a) i) Explain in detail about the principles involved in the use of sterilization and canning.**

**ii) Discuss in detail about the natural and artificial food colorants and also food flavours.**

Food processing and preservation by Sivasankar – 201-251; 20-38

**(OR)**

**b) i) Write in detail about the bacterial and non-bacterial food borne diseases. ii) Describe in detail about the spoilage of meat and beverage food products.**

Food processing and preservation by Sivasankar – 147- 150; 161-165



Reg. No. :

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**Question Paper Code : 50168**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017  
Fifth Semester  
BioTechnology  
BT 6003 – PRINCIPLES OF FOOD PROCESSING  
(Regulations 2013)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. How will you classify carbohydrates ?
2. What are proteins ?
3. Mention the significance of food additives.
4. List out the enzymes used as food processing aids.
5. What are fermented foods ?
6. Define single cell protein.
7. How do you classify food infections ?
8. What are the factors responsible for food infection ?
9. Write the effect of low temperature on microbial activity.
10. State the freezing characteristics of foods.

PART – B

(5×13=65 Marks)

11. a) Explain in detail about the classification, characteristics and importance of vitamins and minerals. (13)
- (OR)
- b) Discuss in detail about the contribution of foods to organoleptic and textural characteristics. (13)

50168



12. a) Write in detail about the food additives, intentional and non intentional additives. (13)

(OR)

- b) Describe in detail about the functional roles of food additives in food processing and preservation. (13)

13. a) Give a detailed note on sources, types and importance of species in food processing and preservation. (13)

(OR)

- b) Write in detail about the importance of species in fermented foods and food chemicals. (13)

14. a) Discuss in detail about the spoilage of vegetable, fruit and poultry food products. (13)

(OR)

- b) Explain in detail about the factors responsible for food spoilage, food intoxication and poisoning. (13)

15. a) Give a detailed note on pasteurization, blanching and thermal death curves of micro organism. (13)

(OR)

- b) Describe in detail about the factors affecting the quality of foods in frozen storages and irradiation preservation of foods. (13)

PART – C

(1×15=15 Marks)

16. a) i) Explain in detail about the principles involved in the use of sterilization and canning. (8)

- ii) Discuss in detail about the natural and artificial food colorants and also food flavors. (7)

(OR)

- b) i) Write in detail about the bacterial and non bacterial food borne diseases. (8)

- ii) Describe in detail about the spoilage of meat and beverage food products. (7)