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Indeed, the essence of human life is to live in such a way to meet the basic demands of food, clothing and shelter. Individually food is very basic need for survival. The demand for processed, packed and convenient food with prolonged shelf life requires well-trained human resources in the food industry and allied sectors.

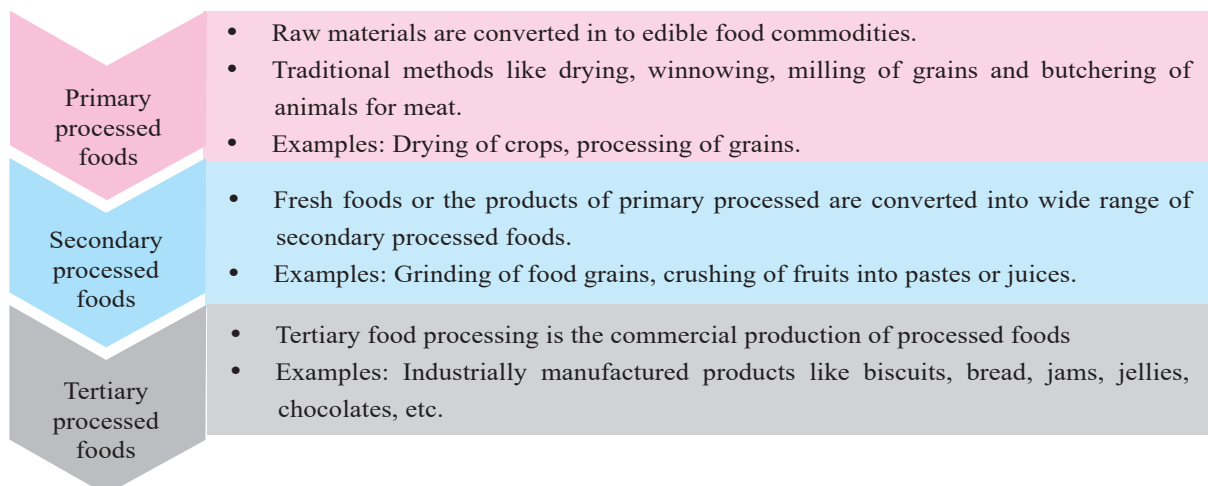
There is an encouraging, challenging and rewarding future for professions and careers in food science and technology. As, this field requires the application of science and technology to the processing, utilization, preservation, packaging and distribution of food and food products. It therefore encompasses a diverse range of specializations.

Food processing is the conversion of raw ingredients into the processed value added form (palatable, digestible, nutritious, stable and safe).

Typically the raw food ingredients like harvested crops or butchered animal products are converted to attractive, marketable and often long shelf-life food products.

The processed food industry may be divided into following broad segments:

1. Primary Processed foods
2. Secondary Processed foods
3. Tertiary Processed foods



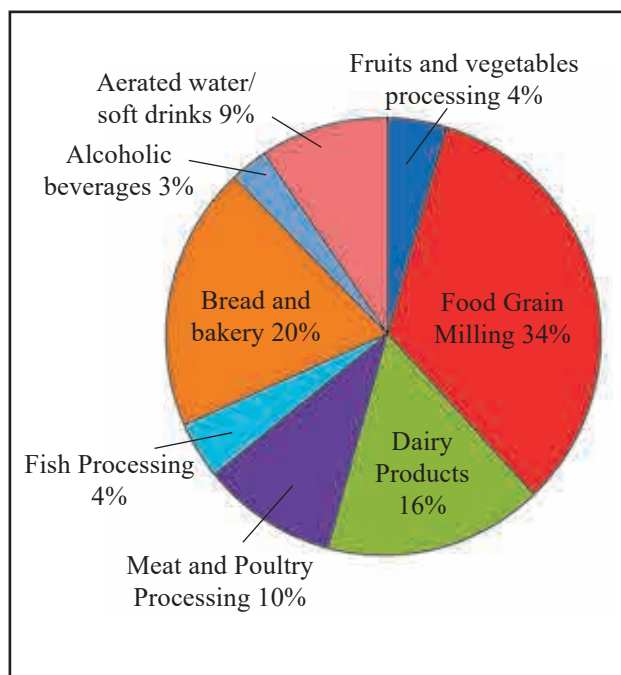
2.1 Major Food Processing Sectors in India:

Food processing is as large sector that covers agriculture, horticulture, plantation, animal husbandry and dairy, fisheries, meat, poultry, etc.

Food processing sectors may be broadly categorized in following segments

- Fruits and vegetables processing
- Dairy processing
- Grain processing
- Meat and poultry processing
- Fisheries
- Horticulture
- Consumer foods including packaged food, beverages and packaged drinking water.

The following diagram depicts the Status of food processing industries in India.



(Source: Annual Survey of Industry (ASI), MOFPI and IMaCS analysis)

Fig. 2.1 : Status of food processing industries in India

2.2 Skill gap management in food industry:

The following table presents the functional distribution of human resources across segment and distribution of human resources by education level.

Table 2.1 : Functional distribution of human resources

Functions	% of employees
Procurement	10
Testing and quality	20
Production	55
R&D	1-2
Storage	2-3
Others (sales and others)	10

Source : Human resource and skill requirements in food processing sector. A report of NSDC (www.nsdcindia.org)

Table 2.2 : Distribution of human resources by education level.

Educational level	% of employees
Management education	1-2
Food technologists	20
Post graduates	0.5-1
Graduates	10
Diploma holders	2-5
Certificate holders	2-5
10 th standard or below	80

Source : Human resource and skill requirements in food processing sector. A report of NSDC (www.nsdcindia.org)

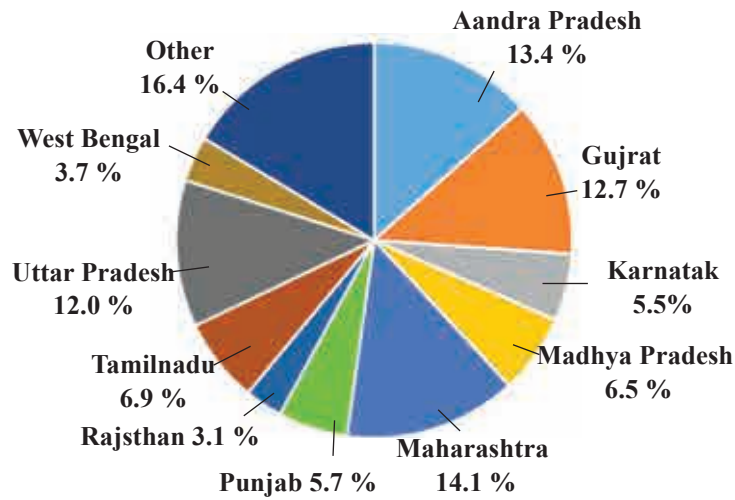
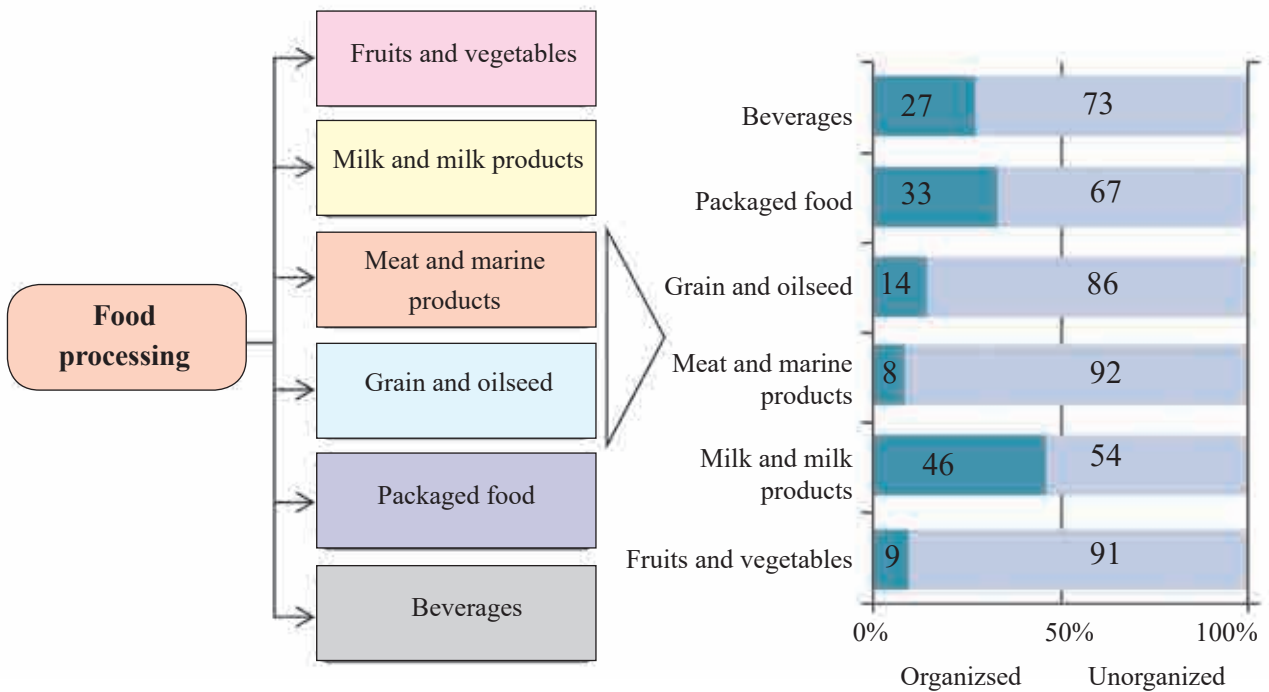


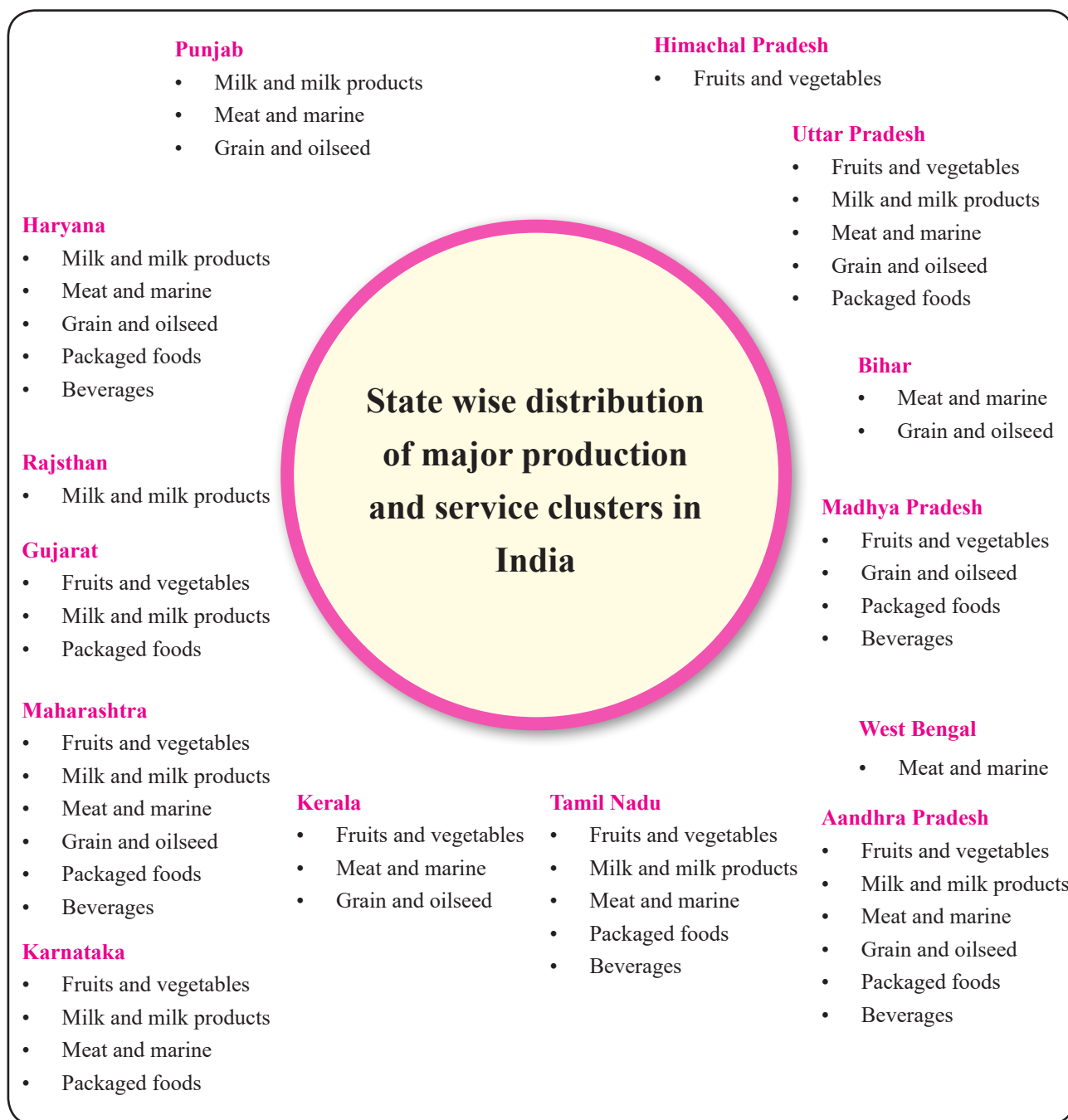
Fig. 2.2 : State wise distribution of food processing unit



Source : Human resource and skill requirements in food processing sector volume 10. A report of NSDC (www.nsdcindia.org)

Fig. 2.3 : Structure of the food processing sector: organised vs. unorganised (by employment)

Cluster : It is a group of food industries formulated by the government to achieve the specific objectives such as development of modern infrastructure to encourage entrepreneurs to set up food processing units based on group approach e.g. food park, special economic zone, etc.



Source : Human resource and skill requirements in food processing sector volume 10. A report of NSDC (www.nsdcindia.org)

Fig. 2.4: State wise major food production clusters in India.

2.3 Organisational structure, job roles and opportunities

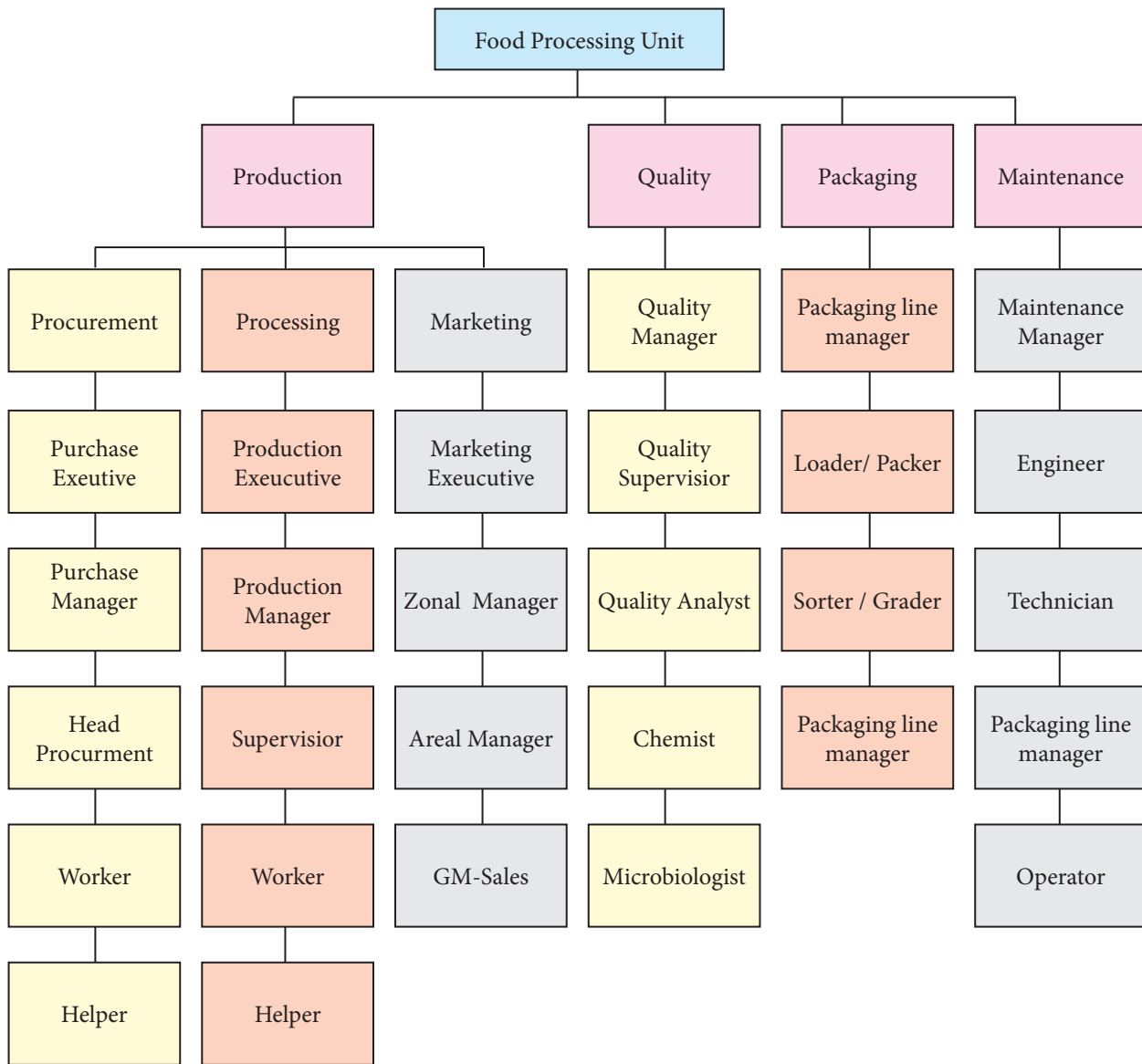


Fig. 2.5 : Flow chart of organizational structure of food processing unit

Table 2.3 : Various job roles in Food Processing Sector

	Process line	Non-Process line
Fruits and Vegetables	<ul style="list-style-type: none"> ➤ Food technologist ➤ Production supervisor ➤ Machine operator ➤ Maintenance technician/Engg. ➤ Refrigeration technician ➤ Packers and loaders 	<ul style="list-style-type: none"> ➤ Procurement executive ➤ Quality head ➤ Shift head ➤ Marketing executive ➤ Research and Development head ➤ Research and Development Scientist

Milk and Milk Products	<ul style="list-style-type: none"> ➤ Chemist/Dairy Technologist ➤ Supervisor ➤ Production manager ➤ Machine operator ➤ Maintenance technician/Engg. ➤ Refrigeration technician 	<ul style="list-style-type: none"> ➤ Procurement executive ➤ Quality head ➤ Shift head ➤ Marketing executive ➤ Research and Development head ➤ Research and Development scientist
Meat and Marine Products	<ul style="list-style-type: none"> ➤ Deboners and butchers ➤ Feeders and hangars ➤ Maintenance technician ➤ Sanitation inspector / Shift supervisor 	<ul style="list-style-type: none"> ➤ Procurement executive ➤ Quality head ➤ Shift head ➤ Marketing executive ➤ Research and Development head ➤ Research and Development scientist
Grains and Oilseeds	<ul style="list-style-type: none"> ➤ Milling operator/Sorter ➤ Shift Supervisor ➤ Production manager ➤ Machine operator ➤ Maintenance technician/Engg. 	<ul style="list-style-type: none"> ➤ Commodity buyer ➤ QC analyst/executive/ manager ➤ Warehouse executive ➤ Marketing executive ➤ Research and Development head ➤ Research and Development scientist
Packaged Food	<ul style="list-style-type: none"> ➤ Packers and loaders ➤ Supervisor QA (Analyst/checker) ➤ Technician 	<ul style="list-style-type: none"> ➤ Research and Development Scientist ➤ Marketing executive ➤ Quality head ➤ Shift head
Beverage	<ul style="list-style-type: none"> ➤ Process line operator ➤ Filling line operator ➤ QA (analyst/chemist) ➤ Shift supervisor and maintenance technician ➤ Electrician and instrumentation engineer 	<ul style="list-style-type: none"> ➤ Procurement executive ➤ Quality head ➤ Shift head ➤ Marketing executive ➤ Research and Development head ➤ Research and Development scientist

Job opportunity: Several profiles and industries, where food technology professionals make a successful career are:

- Production manager, quality manager in food processing, packaging industries (Grains, Fruits, Vegetables, Fish, Meat, etc.)
- Research Scientists
- Academic opportunities
- Product/process development scientist
- Food Quality manager
- Food Safety Officer
- Nutritional therapist
- Regulatory affairs officer

- Scientific laboratories (Analytical) technician
- Technical brewer
- Production supervisor
- Sales, marketing and brand management
- Consultant
- Entrepreneur
- Others (Dietician, nutritionist, diet and fitness counselor)

Note :- FSSAI made it compulsory to appoint food science graduates in each food industry to meet the health, hygiene, safety, GMP, etc. requirements.

2.4 Major universities and institutions

Major universities and colleges in India for studying food science and technology

- Central Food Technological Research Institute (CFTRI), Mysore
- Defence Food Research Laboratory (DFRL), Mysore
- National Institute of Food Technology Entrepreneurship and Management (NIFTEM) Sonapat, Haryana
- Indian Institute of Crop Processing Technology (IICPT), Thanjavur, Tamil Nadu
- National Dairy Research Institute, (Karnal), Haryana
- National Institute of Nutrition (NIN), Hyderabad
- Indian Agricultural Research Institute (IARI), New Delhi
- Central Agricultural University (CAU), Imphal, Manipur
- Indian Institute of Technology (IIT), Kharagpur.
- National Institute of Raurkela (NIT), Odisha
- Indian Council of Agriculture Research (ICAR), New Delhi.

Major universities and colleges in Maharashtra for studying food science and technology

- Vasantrao Naik Marathwada Agricultural University, Parbhani
- Dr. Panjabrao Deshmukh Agricultural University, Akola
- Dr. Balasaheb Sawant Konkan Agricultural University, Dapoli
- Mahatma Phule Agricultural University, Rahuri
- SNTD Women's University, Mumbai and its constituents campuses at Pune, Juhu etc.
- Institute of Chemical Technology Mumbai and two other campus at Jalna Bhubneshwar.
- Laxminarayan Institute of Technology, Nagpur
- Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
- Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
- North Maharashtra University, Jalgaon
- Shivaji University, Kolhapur
- Sant Gadge Baba Amravati University, Amravati
- Some other deemed, private university and colleges in Maharashtra state.
- Vocational education (B. Voc, Food Tech / Dairy Tech) have been started at different universities and colleges under NSQF, UGC, New Delhi.
e.g. SPPU, Pune, Dr. BAMU, Aurangabad, Solapur University, Shivaji University Kolhapur, Mumbai University, etc.

Exercise

Q.1 a) Select the most appropriate option:

- i. _____ is the conversion of raw ingredients into the processed food.
(Food processing, Crop science, Animal science).
- ii. In the _____ food processing raw materials are converted to edible food commodities.
(Primary, Secondary, Tertiary)
- iii. Grinding of food grains is a _____ processed food.
(Primary, Secondary, Tertiary)
- iv. Maharashtra is a _____ producer of fruits and vegetables.
(Largest, Smallest, None)

b) Match the following:

A		B	
i.	Primary food processing	a.	20% employment
ii.	Secondary food processing	b.	Milk and milk products
iii.	Tertiary food processing	c.	Processing of grains
iv.	Food technology	d.	Jam, jelly
v.	Maharashtra	e.	Instant mixes
		f.	Crushing fruit into paste or juice

c) State whether the following statements are true or false:

- i. FSSAI made it compulsory to appoint food science graduates in food industry.
- ii. Bread and bakery industry comprises 20% of food processing industries in India.

Q.2 Answer in brief

- i. Name the segments of Food Processing industry.
- ii. Name the job opportunities in food technology.

Q.3 Short answer questions

- i. Give in short about statewide production of different food commodities in India.

Q.4 Long answer question

- i. Draw a table of all the job roles in a food processing sector.
- ii. Draw a flowchart of a organization structure in a typical food processing unit.

❖ Project :

Visit to food technology colleges / universities / research organization / food industries etc. and prepare short project report on their functional activities.

