

Deendayal Upadhyaya Kaushal Kendra

( Established under UGC approval and financial assistance vide letter no.-----  
dated-----)

B.Voc. in Food Processing and Technology

Scheme and Syllabus

Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot

( Accredited Grade 'A' by NAAC vide letter no.-----dated-----)

**Title of the Programme:** Bachelors of Vocation in Food Processing and Technology leading to degree “B. Voc. (Food Processing & Technology)”

**Introduction:** The University Grants Commission (UGC) has launched a scheme on skills development based higher education as part of college/university education leading to Bachelor of Vocation (B.Voc.) degree with multiple entry and exits such as Certificate/Diploma/Advanced Diploma under the NSQF (National Skill Qualifications Framework). The B.Voc. programme is focused on universities and colleges providing undergraduate studies which would also incorporate specific job roles along with broad based general education. This would enable the graduates completing B.Voc. to make a meaningful participation in accelerating India’s economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge.

B.Voc. (Food Processing and Preservation) course is being run by MGCGV under National Skills Qualification Framework (NSQF) Programme of University Grants Commission, New Delhi. Food processing is a contemporary exercise that develops efficiency and improves promotion of the food products. This course is based on developing set of methods and techniques which can be used to transform raw materials into nutritious and safe food for consumption. Despite the fact that food processing industry in India is at developing stage, it offers exponential career opportunities to trained professionals in food processing. The curriculum has been designed to include general education and skill development components, having extensive practical and on job trainings along with regular industrial visits so that they can be easily absorbed in Food Industry or become Entrepreneurs. University has MoU with several leading Food Processing Industries of the area and they are the industrial partners for this programme. They are supporting in training and placement programmes of students.

**Eligibility**

Any student who has passed the +2 Examination (any stream) under 10+2+3 system education of a recognized university/Board/Council or any other examination recognized by MGCGV as equivalent thereto shall be eligible to offer the subject of Food Processing and Technology. Candidates of Arts/Commerce stream have to attend bridge courses for Mathematics/Biology and they have to clear that paper if they have not opted for that paper in their Inter.

**Level of Awards:**

This programme provides options of multiple entry and exit points i.e. after Diploma and Advanced Diploma.

Award	Duration
Diploma	1 year
Advanced Diploma	2 years
B.Voc. Degree	3 years

**Credit Transfer**

There is a provision of credit transfer in this programme as per the MGCGV rules. Students who have done some Vocational or General courses prior to joining the University will get equivalent transfer of credits for the courses that are similar in nature and content of the courses of B.Voc. programme in which they have taken admission into.

**Relevance of the programme:** The programme in Food Processing and Technology is a judicious mix of skills, professional education related to logistics and also appropriate content of general education. It is designed with the objective of equipping the students to cope with the emerging trends and challenges in the Food Processing sector.

With the economic growth the demands for Food Processing has increased manifold. This has given steep rise to demand for competent professionals and skilled technical associates in Food Processing industry. Increased awareness about quality of Food Products has enhanced the demand. Private manufacturers and vendors of Food Products all look for competent persons who can work at the cutting edge level in a professional manner. This programme is designed to cater to the demands of professionally trained human resource in the field of Food Processing. The programme is highly relevant for all those who want to pursue a professional career in Food Processing industry, marketing or in the field of quality testing etc.

**Aim:**

The programme aims to build individual capacities and train persons with adequate employability skills. The programme structure attempts to blend appropriate technical knowledge and skills, personal and professional skills and substantive ‘hands-on’ and field / site experience required in the trade. Keeping in view the demands of the market and to provide flexible options for students the programme is designed in modular manner and allows entry and exit options at various levels. The learners will have flexibility to develop themselves according to their strengths and career interests.

**Duration :** 6 Semesters (3 years). This three year full time programme is divided into six semesters, each of minimum 15 weeks including assessment. In addition all students are expected to undergo on job training / project work for 4-8 weeks every semester for the first five semesters that may continue partly during summer / winter breaks. Students have to undertake project work in an industry of repute for 12 weeks in their final semester.

**Eligibility:** Entry to First Year - 12th pass in any discipline;

Lateral entry may be offered in the second year of the programme to external candidates who have undertaken courses deemed to be equivalent to the 1st and 2nd year programme and are able to qualify the skill proficiency test organized by the University.

**Admission:** Depending on the number of applications at the time of admission, merit based decision that provides equal opportunity to all will be taken by the admissions committee duly approved by the competent authority of the University.

**Reservation**

Reservation rules of the government of M.P.is followed.

**Programme Structure:**

B.Voc. (Food Processing and Technology) is proposed with a modular structure that gives entry and exit option after every year with employable skill at the end of each module.

The three modules are as under:

**Diploma in Food Processing and Technology:** One Year

**Outcome:** A person having adequate skills to work as an Assistant to a Food Processing Industry. After successful completion of this module and some additional practice the student should be equipped to assist in the production activities as well as act like a Technician in the Lab related activities.

**Advance Diploma in Food Processing and Technology:** Two Year

**Outcome:** A person having adequate skills to work as ‘**Technical Assistant**’ to a Food Processing Industry. After successful completion of this module and some additional practice the student should be equipped to independently handle the technical problems coming in the plant.

**B.Voc. (Food Processing and Technology) (Three Year)**

**Outcome:** A person having skills to work as a **Technical Associate** and **Assistant Manager** to a Food Processing Industry and will act like a ‘multi tasking’ technical person capable of being inducted in the managerial team of the plant.

After successful completion of this module and some additional practice/ experience in an industry the graduate will be equipped to act like a Manager in a micro enterprise and Assistant Manager in Small and Medium scale industries.

**Table 1: Division of General and Skill Components Semester wise**

S.N.	Semester	Hours	Credits
<b>Semester 1 to VI per semester</b>			
1.	General Component	225-300	12
2.	Skill Component	350-450	18
	<b>Sub Total</b>	<b>575-750</b>	<b>30</b>
	<b>Total of all 6 seemesters</b>	<b>3600-4000</b>	<b>180</b>
<b>NB</b>	<b>Basis for calculation of credits</b>		
	1.1hr Theory classes and 2 hr practical classes/outreach activities including skill training in industry or industrial visit/ self study for an average 15 weeks account for 1 credit i.e. Minimum 15 hours per credit is needed for theory classes and this would be 30 hours for practical classes.		
	2. The above table describes the overall distribution of General Component and Skill Component in a broad sense for all the proposed courses. Details of the papers to be taught in the specific programme appears separately as below		

**Detailed Curriculum of B.Voc.( Food Processing and Technology)**

Semester	Component	Course Code	Name of Papers	Credits	Hours	Remarks
Semester I	Skill Component	BFPS-101	Fundamentals of Food Science	3(2+1)	90	Foundation Course
		BFPS-102	Food Microbiology	3(1+2)	75	
		BFPS-103	Basic Cereal Technology	3(2+1)	105	
		BFPS-104	Basic Biochemistry	3(2+1)	60	
		BFPS-105	Work Integrated Learning- I	6(0+6)	90	
			<b>Sub Total</b>	<b>18(8+10)</b>	<b>420</b>	
	General Component	BFPG-106	Communication Hindi	2(1+1)	45	
		BFPG-107	Fundamentals of Computers	4(2+2)	90	
		BFPG-108	Paper - I of Chosen Subject	6(4+2)	120	Electives of chosen General Stream*
			<b>Sub Total</b>	<b>12(8+4)</b>	<b>240</b>	
			<b>Total of 1<sup>st</sup> Semester</b>	<b>30(16+14)</b>	<b>660</b>	
Semester II	Skill Component	BFPS-201	Fruits and Vegetable Processing	5(3+2)	105	
		BFPS-202	Principles of Food Preservation	4(2+2)	90	
		BFPS-203	Food Standards & Safety	3(2+1)	60	Main Vocational Contents
		BFPS-204	Work Integrated Learning –II	6(0+6)	180	
			<b>Sub Total</b>	<b>18(8+10)</b>	<b>420</b>	
	General Component	BFPG-204	Communication English	2(1+1)	45	Compulsory Papers
			Statistical Methods & Analysis	2(1+1)	45	
		BFPG-205	Values and Social Responsibility (VSR)	2(1+1)	50	
		BFPG-206	Paper - II of Chosen Subject	6(4+2)	120	Electives of the chosen General stream*
			<b>Sub Total</b>	<b>12(7+5)</b>	<b>260</b>	
			<b>Total of 2<sup>nd</sup> Semester</b>	<b>30(15+15)</b>	<b>680</b>	
Semester III	Skill Component	BFPS-301	Dairy Technology	6(3+3)	135	
		BFPS-302	Fermented Food Products	5(2+3)	120	
		BFPS-303	Food Plant Sanitation & Hygiene	4(2+2)	90	
		BFPS-304	Work Integrated Learning – III	3(0+3)	90	
			<b>Sub Total</b>	<b>18(7+11)</b>	<b>435</b>	
	General Component	BFPG-356	Computer Programming and Web Designing	3(1+2)	75	Compulsory Papers
		BFPG-306	Environmental Studies and Disaster Management	3(2+1)	60	
		BFPG-307	Paper - III of Chosen Subject	6(4+2)	120	Electives of the chosen General stream*
			<b>Sub Total</b>	<b>12(7+5)</b>	<b>255</b>	
			<b>Total of 3<sup>rd</sup> Semester</b>	<b>30(16+14)</b>	<b>690</b>	

Semester IV	Skill Component	BFPS 401	Food Packaging	4(3+1)	75	
		BFPS 402	Food Quality and Assurance	4(2+2)	90	
		BFPS-403	Food Analysis and Instrumentation	4(2+2)	90	
		BFPS-403	Work Integrated Learning – IV	6(0+6)	180	
			<b>Sub Total</b>	<b>18(8+10)</b>	<b>420</b>	
	General Component	BFPG-404	Accounting Practices	4(2+2)	90	<b>Compulsory papers</b>
		BFPG-405	Values and Social Responsibility (VSR)	2(1+1)	50	
		BFPG-406	Paper - IV of Chosen Subject	6(4+2)	120	Electives of the chosen General stream*
			<b>Sub Total</b>	<b>12(7+5)</b>	<b>260</b>	
			<b>Total of 4<sup>th</sup> Semester</b>	<b>30(15+15)</b>	<b>680</b>	
Semester V	Skill Component	BFPS-501	Process Plant Design	3(2+1)	60	
		BFPS-502	Food Beverages-1(Fruit Based)	4(2+2)		
		BFPS-503	Elective-I	5(3+2)	120	
		BFPS-504	Work Integrated Learning –V	6(0+6)	180	
			<b>Sub Total</b>	<b>18(8+10)</b>	<b>420</b>	
	General Component	BFPG-505	Reasoning and Analytical Ability	2(1+1)	50	Compulsory Papers
		BFPG-506	Paper - V of Chosen Subject	6(4+2)	120	Electives of the chosen General stream
		BFPG-507	Entrepreneurship Development	4(3+1)	90	in any General Subject*
			<b>Sub Total</b>	<b>12(5+7)</b>	<b>290</b>	
			<b>Total of 5<sup>th</sup> Semester</b>	<b>30(13+17)</b>	<b>710</b>	
Semester VI	Skill Component	BFPS-601	Food Beverages-2(Non Fruit Based and Carbonated)	4(2+2)		
		BFPS-602	Elective –II	6(4+2)	120	
		BFPS-603	Project Work	8(0+8)	240	
			<b>Sub Total</b>	<b>18(7+11)</b>	<b>435</b>	
	General Component	BFPG-604	Corporate Social Responsibility (CSR)	2(1+1)	50	
		BFPG-605	Paper - VI of Chosen Subject	6(4+2)	120	Electives of the chosen General stream*
		BFPG-606	Management Information System	4(2+2)	90	
			<b>Sub Total</b>	<b>12(5+7)</b>	<b>260</b>	
			<b>Total of 6<sup>th</sup> Semester</b>	<b>30(12+18)</b>	<b>695</b>	
			<b>Grand Total ( Sem I to VI)</b>	<b>180(89+91)</b>	<b>3510</b>	
<b>Electives</b>						
	<b>Skill</b>	BFPSE1	Fermented Food products	6(4+2)	120	

	<b>Component</b>	BFPSE2	Food Beverages	6(4+2)	120	
		BFPSE3	Processing of Spices and Aromatic Plants	6(4+2)	120	
		BFPSE4	Advanced Processing of Fruits and Vegetable	6(4+2)	120	
		BFPSE5	Bakery and Extruded Products	6(4+2)	120	
		BFPSE6	Food Packaging	6(4+2)	120	
		BFPSE7	Food Auditing	6(4+2)	120	
		BFPSE8	Food Chain Management	6(4+2)	120	
*General Component	*Any two subjects From Science/ Arts / Commerce Streams. One paper each of the two papers is required to be completed in each year. The syllabi of the General component will be, as discussed above, as per the unified syllabus of the Department of Higher Education, Govt. of M.P. One paper each of the 1 <sup>st</sup> 3 semesters of the unified syllabi has to be cleared in each year of the B.Voc. programme in order to complete it. Students desirous of clearing Papers of all the 6 semesters of the unified syllabi may register for other 3 papers additionally. Students wanting to switch from Vocational to General B.A./ B.Sc./ B. Com. after completing Diploma/ Adv. Diploma have to clear the remaining papers of 2 subjects.					Students who had not Mathematics and other science subjects in their Inter have to pass in a non credit Foundation Course in that subject if they want to opt for their subject(s) in under General Component.
Work Integrated Learning	Work Integrated Learning of even semesters will essentially be carried out in some industry in a project mode and reports have to be submitted for evaluation thereof. Work Integrated Learning of odd semesters may be completed in the faculty itself, in addition to industrial visits, by directing the students to undertake the production and marketing of the products combined together with market and consumer survey.					

### **Curriculum of B.Voc. (Food Processing and Technology)**

#### **Detailed Syllabus**

##### **General component:**

Students have to choose 2 subjects from General Streams Viz. Science / Arts / Commerce. The syllabus of the General Subjects will be as per the unified syllabus of the Department of Higher Education, Govt. of M.P. with slight modifications, wherever necessary, considering application part of the specific subject. Students have to essentially clear 18 credits of the two chosen subjects in order to complete B.Voc. They may register and pass for 18 more credits (optional) in the chosen subjects if they want full equivalence of general graduation course or in case of switching over from B.Voc. to B.A./B.Com./B.Sc.

**Semester 1****BFPS101****FUNDAMENTALS OF FOOD SCIENCE****(2+2)****Theory****UNIT 1 : Concept and classification of Food****(6 lectures)**

Concept of food, functions of food; **Five** Basic food groups; Criteria for selection of food; Variation across India and the world , Food science, objectives of food science

**UNIT 2: Status and scope of Food Processing****(8 lectures)**

Present scenario of food processing in India and the world, State wise breakup of India ,Scope of Food Processing in India with respect to employment generation and economic upliftment; Introduction of FSSAI & other statutory regulations, APEDA & Ministry of Food Processing; Government schemes for food processing industries

**UNIT-3: Food Preparation and Storage****(6 lectures)**

Basic terms used in food preparation, pre-preparation for cooking, Storage of raw and cooked food ; Weights and Measures of raw and cooked food

**UNIT-4: Cooking****(6 lectures)**

Meaning, Terms used in cooking, Equipments used in cooking, Weights and Measures of raw and cooked food, Traditional cooking methods, modern cooking methods., Comparison, Objectives and importance of cooking, Terminology associated with cooking

**UNIT-5****(8 lectures)**

**Cereal Cookery-** Gelatinization, Dextrinization and Identity of grain, Processed cereals, millets and Ready-To- Eat cereals used in cooking.

**Pulse and Legume Cookery-** Cooking of Legumes, Factors Affecting cooking time of pulses and legumes, uses of legumes in cookery

**PRACTICALS**

1. Layout plan of the lab and introduction to laboratory rules.
2. Study of equipments used in cooking
3. Methods of cooking
4. Traditional methods – Preparation of any two recipes from the following:
  - a) Boiling b) Roasting c) Frying d) Steaming
5. Modern methods - Preparation of any two recipes from the following:
  - a) Baking b) Solar c) Microwave d) Combination

**Recommended Reading**

1. B. Shreelakshmi : Food Science, New Age International, New Delhi.
2. Swaminathan : Text book of Food Science'', Vol-1, BAPPCO, Bangalore.
3. Devendrakumar Bhatt & Priyanka Tomar : An Introduction to Food Science, Technology & Quality Management, Kalyani Publishers
4. Sumati R. Mudambi : Fundamentals of Food & Nutrition, Wiley Eastern Ltd.,New Delhi.

**BFPS102****Food Microbiology****3 (2+1)****Unit 1: Introduction to Food Microbiology****(7 lectures)**

Microbiology - Definition and importance, history and Scope of food microbiology, contributions of eminent microbiologists- Antony van Leeuwenhoek, Louis Pasteur, Robert Koch etc.

**Microscopy:** Principles-Dark field and bright field microscopy, Phase contrast; Construction and working principles of different types of microscopes- Compound, , Fluorescence and Electron (Scanning and transmission); Basics of smear preparation; Staining- Principles and techniques, types of staining,

## **UNIT 2: Microbial Taxonomy and Sterilization** (7 lectures)

**Microbial Taxonomy:** Concept of microbial species and strains, prokaryotes and eukaryotes; Classification of bacteria based on– (a) morphology (shape and flagella), (b)staining reaction, (c) nutrition and (d) extreme environment; Classification and nomenclature system for microbes

**Sterilization:** Principles and Applications of (a) Physical Methods- Autoclave, Hot air oven, Laminar airflow, Seitz filter, Sintered glass filter, Membrane filter, (b) chemical methods- Alcohol, Aldehydes, Phenols, Halogens, Gaseous agents and (c) radiation methods- UV rays, Gamma rays.

## **Unit 3 : Microorganisms and Food Spoilage** (7 lectures)

Types of microorganisms; Sources of Microorganisms in foods; Classification and Nomenclature; Morphology, Structure and their importance in food ( bacteria, fungi, viruses ,spores, prions, protozoans and others); detection of temperature & structure of micro-organisms  
Microbial Food Spoilage-, some important food spoilage bacteria, spoilage of specific food groups- Milk and dairy products, Meat, poultry and seafood's, Cereal and cereal products, Fruits and vegetables and Canned products

## **Unit 4: Foodborne Diseases** (7 lectures)

Introduction and types of Foodborne diseases; Foodborne infections, Foodborne intoxications and toxic infections ;Origin, symptoms and prevention of some commonly occurring Foodborne diseases and emerging pathogens of concern.

Concept of thermal death time & control of micro-organisms in canned products, fermented products - identification of food borne illness & their control, Introduction of pro-biotic & pre-biotic..... and their role in Food Technology

## **UNIT 5: Principles of Microbial Nutrition** (7 lectures)

The requirements for carbon, nitrogen, sulphur, growth factors etc., role of oxygen in nutrition, nutritional categories among microorganisms;

Methods of measuring growth of micro-organism in food products, Preparation of growth & gram negative Bacteria, Preparation of culture, media & production, Introduction of Laminar, Incubator, Water bath

## **PRACTICALS:**

1. Introduction to the Basic Microbiology Laboratory Practices and Equipments
2. Cleaning and sterilization of glassware
3. To study working principle of Autoclave and Microscope.



4. Preparation and sterilization of nutrient broth
5. To prepare the culture media for microbial cultivation.
6. Isolation of pure culture by pour plate method.
7. Identification of micro-organisms by using Gram-staining method.
8. To study the microbial count by using Haemocytometer.
9. To perform Coli form test in the given sample.
10. To study the standard plate count of given sample.
11. Cultivation and sub-culturing of microbes
12. Preparation of slant, stab and plates using nutrient agar
13. Morphological study of bacteria and fungi using permanent slides
14. To study Simple staining
15. To study Gram's staining
16. To study Negative staining
17. To perform Standard Plate Count Method

### RECOMMENDED READINGS:

1. Atlas, R.M. Microbiology: Fundamental and applications, Macmillan Publishing Company, New York.
2. Pelezar, M.J., Chan, E.G.S. and Krieg, N.R.: Microbiology.
3. Heritage, J., Evance, E.G.V. and Killington, R.A.: Microbiology in action, Cambridge University Press.
4. Prescott, L.M., Harley, J.P. and Klein, D.A.: Microbiology, W.C.B. Oxford.
5. Frazier William C and Westhoff, Dennis C. Food Microbiology, TMH, New Delhi
6. Jay, James M. Modern Food Microbiology, CBS Publication, New Delhi
7. Garbutt, John. Essentials of Food Microbiology, Arnold, London

### **BFPS 103** **Theory**

### **Basic Bio Chemistry**

**3(2+1)**

#### **UNIT 1: Introduction to Bio-Chemistry**

**(7 lectures)**

Definition and composition of food, Significance of Bio-chemistry in food processing and preservation, Role of water in food, Structure of water and ice, Types of water (Free and bound water), Interaction of water with solutes, Water activity and packaging, Water activity and spoilage.

#### **UNIT 2: Carbohydrates**

**(7 lectures)**

Definition of Carbohydrates, Classification (mono, oligo and poly saccharides), Structure of important polysaccharides (starch, glycogen, cellulose, pectin, hemicellulose, gums), Chemical reactions of carbohydrates, Modified celluloses and starches, Browning Reactions: Enzymatic browning, Non – Enzymatic browning, Maillard reaction, Caramelization reaction, Ascorbic acid oxidation

#### **UNIT 3: Lipids /Fats**

**(7 lectures)**

Definition of lipid ,Classification of lipids, Characteristics, Physical properties- (melting point, softening point, specific gravity, smoke, flash and fire point,). Chemical properties-(Reichert Meissel value, Polenske value, Iodine value, Peroxide value, Saponification value, Effect of frying on fats, Changes in fats and oils- Rancidity, Lipolysis, Flavor reversion, Auto-oxidation and its prevention, Technology of edible fats and oils- Refining and Hydrogenation.

#### **UNIT 4: Proteins and Amino Acids**

**(7 lectures)**

Definition of Protein, Classification and Structure - primary structure, secondary structure- $\alpha$ -Helix,  $\beta$ -pleats and  $\beta$  – turn, tertiary structure, Nature of food proteins (plant and animal proteins), Properties of proteins (electrophoresis, sedimentation, amphoterism and denaturation,), Functional properties of proteins eg. organoleptic, solubility, viscosity ,binding, gelation / texturization , emulsification , foaming.

Classification and structure of amino acids, Essential amino acid and their role in human diet

#### **UNIT 5. Vitamins and Minerals**

**(7 lectures)**

Structure, Classification of vitamins; function, diseases due to deficiency of vitamins; requirements and recommended dietary allowances, Definition and classification of metal, function, diseases due to deficiency of minerals, requirements and recommended dietary allowances.

Enzymes and Flavour: Introduction, classification General characteristics, Enzymes in food processing, Industrial Uses of Enzymes - definition and basic tastes, Chemical structure and taste, Description of food flavours, Flavour enhancers

#### **PRACTICALS :**

1. Introduction to Lab and Layout Plan
2. Study of Equipments present in the Laboratory
3. Preparation of primary and secondary solutions
4. Estimation of moisture content
5. Estimation of total ash
6. Determination of refractive index and specific gravity of fats and oils.
7. Soxhlet extraction of fat
8. Protein estimation by Kjeldhal method
9. Estimation of iodine value
10. Estimation of peroxide value
11. Determination of percent free fatty acids
12. Estimation of saponification value

**BFPS104**

#### **BASIC CEREAL TECHNOLOGY**

**5 (3 + 2)**

#### **Theory**

##### **UNIT 1: Introduction**

**(9 lectures)**

Definition of cereals and millets, Difference between cereal & millets, Importance of cereals as food commodity, General introduction, production and utilization trends of cereals; Main cereal crops grown in country, state wise break up, Structure and composition of common cereals (wheat, rice and maize)

##### **UNIT 2 : Rice**

**(9lectures)**

Classification, physicochemical characteristics; cooking quality; rice milling technology sheller/ hullers; by-products of rice milling and their utilization; Parboiling of rice- technology and effect on quality characteristics; processed products based on rice

##### **UNIT 3: Wheat**

**(9lectures)**

Types and physicochemical characteristics; wheat milling - products and byproducts; Cleaning, washing and drying, Operation flow charts of domestic and commercial atta chakies, mini flour mills & roller flour mills, Modern flour mill: Corn, Types and physicochemical characteristics, Methods of corn milling and their by-products of corn milling and their uses.

##### **UNIT 4 : Bakery**

**(9lectures)**

Basic ingredients of bakery products, wheat flour, veg.oil, sugar, flour improver& bleaching agents, Physical & chemical tests of ingredients and its importance, Classification of biscuits : short dough biscuits, hard dough biscuits & fermented dough biscuits, Process flow chart of all different types of biscuits, Types of bread (straight dough and sponge dough), Manufacture of other cereal products (pasta, macron), various processed cereal-based foods; manufacture of whole wheat *atta*, blended flour and fortified flour, manufacture of value-added products;

##### **UNIT 5: Extruder cooking**

**(9lectures)**

Definition of extrusion, mechanism of extrusion, types of extruder their working and function. Theory and mechanics of extruder products, Confectionary products: types of sugar process of making confection: hard boiled and soft boiled confection, candy, chewing gum.

## **Practical**

1. Introduction to Lab and lay out plan
2. Study of the Equipments in the lab
3. Physical-tests on wheat and rice; (equivalent diameter, sphericity, angle of repose, terminal velocity, moisture content)
4. Determination of gluten content in wheat flour;
5. Determination of water absorption power (WAP).
6. Physicochemical and rheological properties of dough.
7. Preparation of bakery products-cake,
8. Preparation of plain biscuit,
9. Preparation of short dough biscuits& hard dough biscuits.
10. Preparation of cookies.
11. Preparation of wafers.
12. Preparation of doughnut.

**BFPS 105**

**WORK INTEGRATED LEARNING**

**3(0 + 3)**

Students have to undertake production work in the campus. Marketing of the products is to be done and students have to maintain the records properly. In addition to this, market/ consumer survey of the products along with visit to industrial units will be a part of this course. Proper record has to be maintained and presented for evaluation. In this semester particular emphasis will be on production of bakery products.

**UNIT I****(7 lectures)**

Introduction: Characteristics of Computers, Evolution of computers, Capabilities and limitations of computers, Generations of computers, Types of computers (micro, mini, main frame, supercomputers), Block diagram of computer, Basic components of a computer system-Input unit, output unit, Arithmetic logic Unit, Control unit, Central Processing Unit, Instruction set, processor speed, type of processors, Flowchart & algorithms and their applications

**UNIT 2****(7 lectures)**

Memory- main memory organization, main memory capacity, Types of RAM & ROM, cache memory, Secondary Storage Devices: Magnetic Tape, Magnetic Disks-Hard Disk, Floppy Disks, Optical Disks: CD, VCD, CD-R, CD-RW, DVD, Blue ray etc. Solid State Storage: Flash Memory: Different types of Pen drives & SD cards, USB Drives, PCs specifications and technological revolutions

**UNIT 3****(7 lectures)**

Input devices: different types of Keyboards, Pointing Devices- different types of mouse, Touch Screens, Joystick, Electronic pen, Trackball, Scanning Devices-Optical Scanners, OCR, OMR, Bar Code Readers, MICR, Digitizer, Electronic card reader, Image Capturing Devices-Digital Cameras. Output devices: Monitors, CRT/LCD/TFT, Printers, Dot matrix, Inkjet, Laser, Plotters, Drum, Flatbed, Screen image projector, ATMs

**UNIT 4****(8 lectures)**

Computer Software - Software's its Need, Different types of software - System software, Application software, System software-operating system, utility program, Introduction to operation system for PCs-DOS, windows, Linux, file allocation table (FAT & FAT32), files & directory structure and its naming rules.

**UNIT 5****(9lectures)**

Programming languages - Machine, Assembly & high level Languages, 4GL, Merits and demerits of different computer languages, assemblers, compilers and interpreter, Application software and its types, Word-processing, Spreadsheet, Presentation graphics, Uses and examples and Area of application of each of them, Computer security, File security, Virus working, feature, types of viruses, virus detection, prevention and cure.

**Practicals**

1. MS-Windows: features
2. Documentation Using MS-Word
3. Electronic Spread Sheet using MS-Excel
4. Database Management using Excel
5. Presentation using MS-PowerPoint
6. Creating tables in MS ACCESS using different ways.
7. Import and export data from MS ACCESS.
8. Creating queries in MS ACCESS
9. Creating forms in MS ACCESS
10. Working of Internet with Different Browsers (Internet Explorer, Google Chrome, Mozilla).
11. Applications of Internet. (Handling Email accounts.)
12. Student Have to Do Following Activities:
  - a. How to create Email
  - b. How to send email?
  - c. How to Download the Data?
  - d. How to attach files with email?

**RECOMMENDED READINGS:**

1. Fundamental of Computer by P. K. Sinha
2. Fundamental of computer by V. Rajaraman

1) क्लरिड

इकाई 1

संप्रेषण— अर्थ व महत्व, प्रभावी संप्रेषण के आवयक तत्व, संप्रेषण के तरीके—बोलकर, लिखकर, चित्र व अन्य माध्यम, पत्र लेखन— पत्रों के विभिन्न प्रकार, औपचारिक व अनौपचारिक पत्र, कार्यालयीन व व्यापारिक पत्र, भासकीय व अर्द्ध भासकीय पत्र

इकाई 2

व्याकरण में कारक का महत्व, वाक्य संयोजन, वाक्यों के प्रकार, वाक्यों की सामान्य अशुद्धियां

इकाई 3

मुहावरे व कहावतें, प्रत्यय व उपसर्ग का प्रयोग, समानार्थक व भिन्नार्थक भाब्द, कई भाब्दों के बदले एक भाब्द

इकाई 4

सारांश लेखन, निबन्ध लेखन

इकाई 5

विभिन्न अवसरों के लिए लेखन— नारा लेखन, कविता, नाटक, संवाद लेखन, चित्रों की व्याख्या

2) क्लरिड

1. संवाद अदायगी

2. भाषण

3. बॉयोडाटा लेखन

4. साक्षात्कार

5. सोशल मीडिया व सूचना प्रौद्योगिकी का प्रयोग

6. समूह चर्चा

7. चित्र देखकर कहानी लिखना

8. विभिन्न अवसरों के लिए नारा लेखन

9. अपने उत्पाद की बिक्री बढ़ाने के लिए प्रभावी विज्ञापन बनाना

10. सेमिनार प्रस्तुति

## **SEMESTER 2**

**BFPS 201**

**FRUITS AND VEGETABLE PRESERVATION**

**5(3 + 2)**

### **UNIT-1**

Introduction to Food Processing: Definition, Objectives, scope of food processing industries, Principle of preservation, Methods of preservation, Introduction to Different processes employed in food processing viz. Milling, Cooking, Boiling, Steaming, Braising, Stewing, Roasting, Frying, Grilling, Baking, Fermentation, Pickling, Refining.

### **UNIT-2**

High temperature preservation; Canning- Introduction and application & steps involved: Blanching, pasteurization and Sterilization

Low temperature preservation, Cooling, Chilling and Freezing, Storage of Food, Freezing point of Food, Ice Crystals formation, quick and slow freezing

### **UNIT-3**

Preservation by drying and dehydration, Treatment prior to drying, Drying procedures, Sun and Mechanical drying in fruits & vegetables, reconstitution and cooking, storage of dried foods

Radiation preservation – Types of radiation, importance of radiation on fruits, physical and chemical changes by radiation, effects of radiation on cost, shelf life and nutrition

### **UNIT -4**

Methods in Food Processing - Microwave processing, Extrusion cooking, Ohmic Heating, Reverse Osmosis, Electro dialysis, Ultra-filtration, High Pressure Processing, Super critical fluid extraction

### **UNIT-5.**

Chemical preservation: Definitions and classifications of chemical preservative, bacteriostatic agents, fungistatic agents, germicidal agents, antioxidants, neutralizers, stabilizers and firming agents, use of sulphur dioxide and benzoic acid, tolerance of chemical preservative, use of antibiotics, sugars and salts , Safety in use and certification levels,

Preservation by fermentation – Curing and Pickling; Smoking ,Preservation by high osmotic pressure (Pickling, salting, curing – principles)

### **PRACTICALS-**

1. Introduction to Lab and Layout Plan
2. Study of Equipments present in the Lab
3. To study preservation by high temperature
4. To study the effects of preservation by low temperature
5. Preservation of fruits by sugar ( Preparation of Morabba)

6. To study the effect of drying and dehydration on preservation (dehydration of spinach and coriander leaves)
7. To study the effects of chemical preservatives on fruit juices
8. Canning of fruits and vegetables
9. To blanch a seasonal fruit or vegetable & assess quality of blanching process.
10. To study the effect of browning on raw fruits & vegetables.
11. To study effect of heat and acidity on milk proteins.
12. To study the effectiveness of pasteurization .
13. To study Pasteurization of milk using microwave technique.
14. To study different methods of food processing i.e. by heat, low temperature & drying on a given food sample.
15. To check the shelf life of a given food at ambient temperature and under refrigeration.
16. Bacteriological estimation of milk by MBRT.

**BFPS 202**

**Principles of Food Preservation**

**4(2+2)**

### **UNIT I**

**HIGH TEMPERATURE PRESERVATION:** Introduction to heat processing, Death of bacteria subject to moist heat, Lethality of thermal processes, Basic considerations, the general & mathematical methods. Adequacy of thermal process time, Canning: introduction, Applications & steps involved; Blanching, Pasteurization and sterilization.

### **UNIT II**

**LOW TEMPERATURE PRESERVATION:** Metabolism as a function of temperature, refrigerated or chilling storage of foods, Disorders of refrigerated stored foods. Freezing point of foods, ice crystals formation, quick and slow freezing, various methods of freezing, comparison of chilling and frozen storage.

### **UNIT III**

**RADIATION PRESERVATION:** Type of radiations important in irradiation of foods, Physical and chemical changes induced by radiations, interaction of radiation with living organisms. Radiated foods: Cost, shelf life, nutrient and other losses, wholesomeness, safety of working personnel and dosimetry.

### **UNIT IV**

**DRYING AND DEHYDRATION:** Principles of preservation by drying and dehydration, Treatments prior to drying, drying procedures, sun drying, mechanical drying and freeze drying, comparison between different methods, Effect of water removal on foods, Reconstitution and cooking, storage of dried foods, osmosis in dehydration of foods.

### **UNIT V**

**CHEMICAL PRESERVATIVES:** Definitions and classifications, bacteriostatic agents, fungistatic agents, germicidal agents, antioxidant, neutralizers, stabilizers and firming agents, use

of sulphur dioxide and benzoic acid, tolerance of chemical preservative, use of antibiotics, sugars and salts.

### **PRACTICALS:**

1. Thermal processing of a given food stuff (Pea canning)
2. Chemical preservation (KMS for citrus juice)
3. To check the adequacy of blanching.
4. To study drying rate curve for a given food sample.
5. Drying time, dehydration ratio, shrinkage & rehydration.
6. To conduct experimental studies on preservation using sugar and salt.
7. To perform osmotic dehydration of a given food sample.

### **RECOMMENDED READING:**

1. Fenema O.R. Ed., 1985, principles of food science by part ii physical principles of food preservation, Marcel Dekker, New York.
2. Potter, N.N., 1978, Food science, CBS Pub, New Delhi.
3. A Text Book of Food Science and Technology by Avantina Sharma, IBH Lucknow.
4. Text Book of Food Science and Tech by Vijai Khaddar ICAR

**BFPS 203**

**Food Standards, Safety and GMP**

**3(2+1)**

#### **UNIT 1: Food laws and Standards**

Indian Food Regulatory Regime, History, National and International laws & Regulations: USFDA, EU, Codex alimentarius, World Trade Organization (Sanitary and Phyto., Sanitary agreement, Technical Barriers in Trade), -Standards of Identity, Standards of Quality, Standards of fill of the container. (**Chap.10, Forsythe and FSSA act**)

#### **UNIT 2: Introduction to Food Safety**

Definition, types of hazards, biological, chemical, physical hazards, Factors affecting Food Safety. Importance of Safe Foods

#### **UNIT 3: Food Safety Management Tool**

Basic concept, Prerequisites- GHPs , GMPs, SSOPs etc. HACCP, ISO series, TQM - concept and need for quality, components of TQM, Kaizen., Risk Analysis. Accreditation and Auditing.

#### **UNIT 4: Hygiene and Sanitation in Food Service Establishments**

Introduction, Sources of contamination, Control methods using physical and chemical agents. Waste Disposal Pest and Rodent Control, Personnel Hygiene, Food Safety Measures.

#### **UNIT 5: Recent concerns**

New and Emerging Pathogens, Packaging ,Product labelling and Nutritional labelling, Genetically modified foods \ Transgenics, Organic foods Newer approaches to food safety. Recent Outbreak.

### **PRACTICAL**



1. Microbiological Examination of different food samples
2. Bacteriological Analysis of Water
3. Assessment of surface sanitation by swab/rinse method
4. Assessment of personal hygiene
5. Biochemical tests for identification of bacteria
6. Scheme for the detection of food borne pathogens
7. Implementation of FSMS – HACCP, ISO : 22000

### **RECOMMENDED READINGS:**

1. Lawley, R., Curtis L. and Davis, J. The Food Safety Hazard Guidebook , RSC publishing, 2004
2. De Vries. Food Safety and Toxicity, CRC, New York, 1997
3. Marriott, Norman G. Principles of Food Sanitation, AVI, New York, 1985
4. Forsythe, S J. Microbiology of Safe Food, Blackwell Science, Oxford, 2000 & Sons; USA, 1987

### **BFPS 204**

### **WORK INTEGRATED LEARNING**

**6(0 + 6)**

Students have to undergo industrial training/ production work for a minimum of 180 hours or 1 month. Proper record has to be maintained and presented for evaluation. Besides that they have to do production, marketing and survey work. This semester would be specially devoted for production related to jelly, jam, candy and pickles. Particular emphasis will be on production and marketing of different kind of jelly, jam and pickles

### **BFPG 204** **THEORY**

### **COMMUNICATION ENGLISH**

**4 (2 + 2)**

#### **UNIT I: Introduction to Communication (9 lectures)**

Communication - its meaning and its importance, Type of communication - oral, written and non verbal, Mode of Communication- Monologue, Dialogue, Group discussion, Essentials of good Communication- Effective communication, Miscommunication. English phonology, Intonation patterns in English, Intra-personal, Inter-personal and Group communication

#### **UNIT II : Current Usage of English Grammar (9 lectures)**

Spotting the errors pertaining to Nouns, Pronouns, Adjective and Adverbs, Concord (Grammatical Concord, National Concord) and the Principal of Proximity between Subject and Verb, Correct use of Tense, Precis writing

#### **UNIT III : Vocabulary ( 9 Lectures)**

Verbal and Non-verbal (Spoken and Written) Personal, Social and Business Phrasal Verbs, Changing the Voice: from Active to Passive and vice-versa, Lexis- Idioms and phrases: Words Often Confused, One-word Substitutes, Formation of Words (Suffixes, Prefixes and Derivatives), Collocations

#### **Unit IV: Written Business Communication ( 9 Lectures)**

Business Communication, Different forms of letter writing – Formal and Informal letters, Official Letters, Business Letters, Memo, Notes, Tender Notice, Email Etiquette, Professional Presentations, Writing Skills, Documenting, Report Writing, Making notes, Letter writing , Writing a Resume, Writing- Memo and Note, Cover Letter

#### **UNIT V: Introduction to principal components of spoken English (9 lectures)**

Transcription, Word-Accent, Intonation, Weak Forms in English, Developing Reading and Writing Skills through tasks/ activities as Developing Outlines, Key Expressions, Situation, Slogan Writing and Theme Building Exercises, Dialogue Writing, Interpreting Pictures/ Cartoons

## PRACTICALS

1. How to locate reading material in the library
2. How to look up words in a dictionary
3. How to look up information from an encyclopedia
4. Acquaintance with 44 sounds of pronunciation
5. Developing, Listening, Speaking and communicating Skills through Various activities such as
  - Introducing self and others
  - Role play Activities
  - Practicing Short Dialogues
  - Debates
  - Speeches
  - Group Discussion
  - Telephonic Conversation
  - Paper reading
  - Listening to News Bulletins
  - Viewing and Reviewing of TV Programmes
  - Mock Interview
  - Resume writing
  - Seminar presentation on a given topic/theme
6. Using IT and Social media – Profile generation, Blog Writing
7. Story writing by seeing picture
8. Cartoons
9. Advertisement- effective use use of jingles

## REFERENCES

### Recommended Readings:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. LALA, PUSHP and Sanjay Kumar. 'Communicate or collapse: a handbook of effective public speaking, group discussions and interviews'. PHI Learning Pvt. Ltd., 2007.
5. H.M.Prasad, 'How to prepare for Group Discussion and Interview'. Tata McGrawHill,
6. R.S. Aggarwal, 'A Modern Approach to Verbal & Non-Verbal Reasoning', S. Chand & Co,
7. Aysha Viswamohan, "English for Technical Communication", Tata Mc-Graw – Hill Publishing Company Ltd., New Delhi
8. E.Suresh Kumar and P. Sreehari, "A Handbook for English Language Laboratories", Osmania University, Hyderabad, 2011

## SEMESTER 3

**BFPS 301**

**DAIRY TECHNOLOGY**

**6(3 + 3)**

### UNIT 1

Market milk - Definition, composition, factors, affecting composition, physio- chemical properties of milk and other dairy products, milk reception and storage, Microbiology of milk. Problems of milk collection, Cow's and buffalo's milk – composition of milk

### UNIT -2

Liquid milk processing- pasteurization, sterilization, homogenization, standardization. Fortification of milk and milk products, different types of packaging e.g. bottling, filling in pouches, Sterilised milk, Manufacture of skim milk powder, whole milk powder, condensed milk. Infant Foods

### UNIT -3

Production and preservation of cream, butter, ghee, butter oil and flavoured milk, Skim milk, toned milk, whole milk. Manufacture of cream, butter, ghee.

#### **UNIT -4**

Technology and process calculations for dried, evaporated and condensed milk products

#### **UNIT -5**

Technology and chemistry of cheese, Ice-cream and Indian dairy products- Dahi, Srikhand, Panir, Chhena Cleaning, Sanitation and corrosion control in Dairy plants

#### **Practicals**

1. Introduction to Lab and Layout Plan
2. Study of Equipments
3. Platform test of Milk
  - (a) COB Test,
  - (b) Fat Test,
  - (c) SNF Test,
  - (d) Specific Gravity Test,
  - (e) MBRT Test
4. Pasteurization, Study of HTST and LTLT, Pasrturizer
5. Study about Cream separator- manual and power operated
6. Preparation of flavoured milk, Curd, Paneer, Cheese and to check the effect of various constituents on Product Quality
7. Analysis of cost of Production and a visit to milk collection centre and milk processing plant

## **Fermented Food Technology**

**05(3+2)**

#### **UNIT -1**

**(6 Lectures)**

Introduction - Definition and scope of Industrial Microbiology, Fermentation Equipment and its use.

#### **UNIT -2**

**(10 Lecture)**

Industrial costing - Classification of costs-direct labor direct material, overhead, prime cost, Basis and Development of Industrial Fermentation Processes Screening (i) Primary screening (ii) Secondary screening.

#### **UNIT -3**

**(10 Lecture)**

Detection and Assay of fermentation products: (i) Physical chemical analysis (ii) Biological assay. Stock cultures, Fermentation media - (i) Media composition (ii) Media sterilization and contamination (iii) Inoculums media (iv) Screening for fermentation media

#### **UNIT -4**

**(10 Lecture)**

Inoculums preparation. Scale up of fermentations, alcoholic fermentations, production of industrial alcohol, mechanism of ethyl alcohol fermentation.

#### **UNIT -5**

**(12 Lecture)**

Economic study patterns- Basic economic study patterns, steps in making economic studies of new Beer production : Medium preparation : Malting, mashing, separation of wort, wort boiling

& hops addition, fermentation separation & maturation, carbonation, packaging. Fermentation food - Cheese, sauerkraut, Soya sauce, yoghurt, Vitamin b12 & Riboflavin, Penicillin & Streptomycin, Vinegar and Acetic acid manufacture, its spoilage and prevention. Fulfillment

### **PRACTICALS:**

1. Isolation of industrially important microorganisms from natural environments and foods;
2. Study and operation of laboratory Fermenter;
3. Laboratory scale production of microbial metabolites such as organic acids,
4. lipids, exopolysaccharides, etc.;
5. BOD and COD measurements in industrial effluents; visit to related industries.

### **Recommended Readings:**

1. Industrial Microbiology by L. E. Casida, Willey Eastern Pub.
2. Perman D. 1977-79. *Annual Reports of Fermentation Processes*. Vols. I-III.
3. Prescott SC & Dunn CG. *Industrial Microbiology*. Mc Graw Hill.
4. Waits MJ. *Industrial Microbiology*. Blackwell Science.
5. Ward OP. *Fermentation Biotechnology*. Prentice Hall.

**BVFP3S4** **Food Plant Sanitation and Hygiene** **5(3 + 2)**

**BVFP3S5** **Work Integrated Learning** **3(0 + 3)**

Students have to undertake industrial visit/ production work /marketing/survey/industrial training in any industry or in the University for a Minimum of 90 hours or 2 weeks and present the record for evaluation.

## Computer Programming & Web Design

### UNIT I - Concepts of HTML

Basic principles involved in developing a web site, Planning process, Golden rules of web designing, Design Concept, Designing navigation bar, Page design, Home Page Layout, Introduction to elements of HTML, HTML and its version, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Colors and its values, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags, Working with Text, Working with Lists, Tables and Frames, Hyperlinks, Images and Multimedia, Forms and controls, Multimedia applications

### UNIT II - Concepts of CSS

Introduction of CSS, Creating Style Sheet, CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model (Introduction, Border properties, Padding Properties, Margin properties), CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute selector), CSS Color, Creating page Layout and Site Designs.

### UNIT III - JAVA Script & Web Hosting

Introduction to JavaScript, Basic Syntax, Control Structures, Writing Functions, Working with Arrays, The Document Object Model, Events Handling, Browser Objects, Object Oriented concept of JavaScript, Understanding FTP, Setting up FTP Server (Live), Uploading and downloading FTP contents, Deploying application on Web Server, Preparing HTML from Design, Hosting on Live Server

### UNIT IV - Concept of DBMS

Database System, Purpose of database system, view of data, relational databases, database architecture, The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction. Database design and ER-Model, Constraints, weak entity sets, Codd's rules, Relational Schemas, keys, integrity rules, Relational algebra, Operators, grouping and ungrouping, Tuple's relational calculus, Domain relational Calculus, computational capabilities etc

### UNIT V - Working With MySQL/SQL

Client/Server Concepts, Database and Database Objects, Data Definition using SQL : Databases, Data Types, Tables, Constraints and Indexes, Views, Recurring SQL Constructs, Adding data, Modifying data, Removing data, Searching data, Expressions, Grouping and Aggregate Functions, Joining Tables, Transaction Concepts, SQL for working with Transaction, Tools for Import/Export, SQL for Import/Export

PRACTICALS

**Unit – 1: Multi-disciplinary nature of environment****(8 Lectures)**

**Definition and Composition of Environment** – Lithosphere, Hydrosphere, Atmosphere, Biosphere, Hydrological Cycle; Historical Development, approaches, scope and importance of Environment Studies

**Man and Nature-** relation and interaction with respect to Food, Clothing, Shelter and Occupation

**Concept of Ecology and Ecosystem-** Structure, types and function of different ecosystems- Forest , Grassland, Dessert , Aquatic ecosystems; Producers, consumers and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids

**Bio-diversity-**definition, genetic, species and ecosystem diversity, Bio-geographical classification of India; Value of Bio-diversity: consumptive use, productive use, social, ethical, aesthetic and option values, Bio-diversity at global, National and local levels, India as a mega-diversity Nation, Threats to Bio-diversity; Habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India; Conservation of Bio-diversity- In- situ and Ex- situ conservation of Bio-diversity

**Unit -2: Resources, Wealth and Environmental Protection****(8 lectures)**

**Natural Resources-** Meaning and Types of Resources- Forest resources, Mineral resources, Water resources, Food resources, Land resources, Energy resources; Use and over exploitation of resources- its effect, use of technology and its impact on natural environment

**Wealth** – meaning, Distinction between wealth and resources, Optimum Conversion of Resources into wealth; Measures for conservation of natural resources, Water conservation , rain water harvesting , watershed management, Wasteland reclamation , Use of Renewable Energy Sources, Consumerism and waste products

**Environmental and other affects** of (a) deforestation (b) mining (c) dams and reservoirs (d) Modern agriculture (e) industries (f) other developmental projects; Resettlement and rehabilitation of people; its problems and concerns: case studies

**Environmental Ethics-** Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust., Case studies; Conflict between development and environmental conservation, Equitable use of resources for sustainable lifestyles, Need for public awareness, Role of an individual in conservation of natural resources , Role of and Measures to increase public awareness towards environmental issues- Role of family, schools, Government and NGO institutions, Role of Information Technology in environmental issues

**Unit – 3: Environmental Pollution , Waste Management and Environmental Protection****(8 lectures)**

**Environmental Pollution** - Definition, Causes , effects and control measures of different types of environmental pollution- (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution, (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards; Role of individual in prevention of pollution, case studies

**Waste Management-** Domestic, Industrial; Solid waste Management- Causes, effects and control measures of urban and industrial wastes; Measures taken by Government and Non Government bodies; Laws governing industrial waste disposal; Recycling of waste; Case studies

**Environmental Protection and Assessment** – Actions for environmental Protection, National and international initiatives, emerging environment management strategies, Indian initiatives, Environmental Protection Movements and NGOs in India; Environmental Impact Assessment (EIA), Environmental Auditing, Environmental Legislation in India, Carbon Bank ;

**Legislative measures:** Issues involved in enforcement of environmental legislation Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act

**Unit – 4: Hazards and Disasters****(8 lectures)**

**Definitions and Principles-** Emergency, Vulnerability, Population displacements, Complex emergencies, Classification of Disasters, Levels of Disaster, Effect of Disasters, Causal Factors of Disasters, Poverty, Population Growth, Rapid Urbanisation, Transition in Cultural Practices, Environmental Degradation, Climate Change, Typology of Disasters, Lack of Awareness and Information, War and Civil Strife, Phases of Disaster, Rapid Onset Disasters, Slow Onset Disasters

**Natural Calamities-** Calamities of Meteorological/ Climatic Origin, Calamities of Hydrological Origin, Calamities of Geological Origin, Calamities of Extra-Terrestrial Origin; Earthquakes, tsunamis, Tropical Cyclones, Floods, Droughts, Human Epidemics and Pandemics, Exotic Animal Diseases, Insect and Vermin Plagues

**Man made disasters-** Terrorism, Technological Hazards, Structure Collapse, Fire, Hazardous and Toxic Materials, Transportation, Space Disasters, Chemical and Industrial Accidents

**Human Body and effect of disaster on it-** Basics of Body Systems, Nervous Systems, Reproduction system, Immune system; Impact of disasters on Human Health, Biological hazards, Chemical hazards, Physical hazards, Sociological hazards, Biological effects of massive chemical exposures, Feeding mega doses, Cancer and the environment, Infectious diseases, Anthrax, Food borne diseases, Dengue Fever, Flu (Influenza), Bird (Avian) Flu, Plague, Severe Acute Respiratory Syndrome (SARS), Tuberculosis (TB), Diseases caused by environmental pollution, water and air borne diseases, WHO's Goal

**Unit - 5**

### **DISASTER PREVENTION AND CONTROL**

**Disaster Management in India:** National Policy, Historical Framework, Indian Agencies for Disaster Management, Indian Red Cross Society, National Institute of Disaster Management, Niti Ayog (erstwhile Planning Commission), National Civil Defence Organisation, The Bharat Scouts & Guides, National Crisis Management Committee (NCMC), Crisis Management Group, The Disaster Management Act, 2005, The National Disaster Management Authority (NDMA), State Disaster Management Authorities, District Disaster Management Authority, Role of District Magistrate, National Disaster Response Force (NDRF), Indian Paramilitary Forces, Role of Armed Forces in Disaster Relief

**International Practices-** The United Nations System, United Nations Disaster Relief Coordinator (UNDRO), UNDRO Mandate in Disaster Relief and Management, General Assembly, Guiding Principles, Prevention, Preparedness, Stand-By Capacity, Consolidated Appeals; Coordination, Cooperation And Leadership; Continuum From Relief To Rehabilitation And Development, International Decade For Natural Disaster Reduction, Yokohama Conference, Kobe Conference, Plan of Action

**Predictability and Preparedness –** Introduction of the Instruments used in Metreology, Climatology Hydrology and Seismology; Epidemics- Causal Phenomena, Typical Effects, General Characteristics, Possible Risk reduction measures, Predictability, Specific Preparedness Measures, Factors Contributing to Vulnerability, Typical Post-Disaster Needs, Case studies

**Continuous Internal Assessment:** Projects / Presentations / GD / Tests

#### **Practicals**

1. Visit to a local area to document environmental assets- river/ forest/ grassland/hill/ mountain.
2. Visit to a local polluted site- Urban/ Rural/ Industrial/ Agricultural.
3. Study of common plants, insects, birds.
4. Study of simple ecosystems- pond, river, hill slopes, etc.
5. Case studies related to
  - (a) Deforestation
  - (b) Dams
  - (c) Mining
  - (d) Water logging and salinity
  - (e) Land degradation
  - (f) Land slides
6. Specific Case Studies

Chernobyl Nuclear Accident: Disaster and Development

Drought in India and the Water Crisis: Disaster and Development

Mumbai Floods: Disaster and Development

Orissa Cyclone in 1999: Meteorological Disaster

Monsoon Floods in India: Hydrological Disaster

Train Accidents in India: Transportation Disaster  
Pandemic Lessons: Avian Flu of 1918: Epidemic/Pandemic Disaster

7. Movies:

1. An Inconvenient Truth, Al Gore
2. The 11th Hour, Leonardo DiCaprio
3. The Age of Stupid. Franny Armstrong.
4. Baraka, Ron Fricke.
5. Climate change: An Untold Story [Climate's First Orphans;
6. The Weeping Apple Tree; A Degree of Concern; A Green Agony], Discovery Channel.
7. Liquid city--Mathew Gandy.
8. Story of Stuff --Free Range Studios Tides Foundation.
9. Story of bottled water---Free Range Studios Tides Foundation

**Recommended Books:**

1. R. Rajagopalan, R. *Environmental Studies – From Crisis to Cure*, Delhi
2. Guha Ramachandra *Environmentalism: A global history*
3. *Environmental Studies*, Gupta A.K and Kaur G., 4th edition, Tara Publications, Yamuna Nagar, Haryana.
4. *Environmental Chemistry*, A.K. De, Wiley Eastern Ltd., New Delhi.
5. *Environmental Biotechnology*, Agarwal S.K. , APH Publishing Corporation, New Delhi
6. *Environmental Science and Technology*, Stankey E.M. , Lewis Publishers, New York.

**SEMESTER 4**

**Food Packaging**

**4(3+1)**

**UNIT -1**

Basic concept of food packaging, function of food package, packaging materials- glass, metal, metal foils, papers, films and their composites, common packaging forms under rigid, semi rigid and flexible class of package, Retortable flexible package, Aseptic packaging.

**UNIT -2**

Selection of material, Machinery and method of packaging, package printing and labeling standards and their requirements.

**UNIT -3**

Development of package, evaluation of packaging materials and package performance.

**Unit-4**

Product characteristics viz-a-viz package requirement for dairy industry, Bakery and confectionery, fresh fruits and vegetables.

**UNIT -5**

Product characteristics viz-a-viz package requirement for frozen fruits and vegetables, processed fruits and vegetables, snack foods.

**PRACTICAL:**



1. Study the dehydration process
2. Study the freezing characteristics of foods
3. Study the process of evaporation
5. Determination of viscosity of foods
6. Identification of packaging materials
7. Testing of packaging materials
8. Demonstration of vacuum/gas packaging of foods

**BFPS 402:** **Food Quality and Assurance** **4(2+2)**

**OBJECTIVES:**

1. To understand basic quality attributes of foods in raw as well as processed form.
2. To learn various systems of objective and subjective evaluation and their application in industry.

**UNIT 1:Introduction to quality attributes**

Appearance, flavour, textural factors and additional quality factors

**UNIT 2:Taste**

Introduction, organs involved in taste perception- tongue, papillae, taste buds, salivary glands, mechanism of taste perception, chemicals responsible for sweet, salt, sour, and bitter taste their structure and,chemical dimensions. Factors affecting taste quality, reaction time and factors affecting it

**UNIT 3: Olfaction**

Introduction and definition, mechanism of odour perception. odour classification, chemical specificity of odour. measurement of odour using different techniques – primitive, double tube olfactometer, Elseberg techniques, Wenzel's olfactometer, of each methods, olfactory abnormalities.

**UNIT 4:Colour**

Introduction to natural and synthetic colours, functions of colour in foods,Optical aspect of colour, perception of colour, objective evaluation, colour measurement using different systems-Munsell colour system, CIE colour system, qualitative and quantitative analysis of colour, reflectance spectrophotometry and Colorimetry

**UNIT 5: Texture**

Introduction, Definition and classification of texture profile, Subjective evaluation, phases of oral processing. Objective analysis, rheological methods of texture measurement.

**PRACTICAL:**

1. To perform sensitivity tests for four basic tastes
2. To perform difference tests
3. To identify a few chemicals and related odors
4. Sensory evaluation of milk and detection of flavor defects in milk.
- 5.Extraction of pigments from various fruits and vegetables and influence of heating time and pH
6. Sensory evaluation of biscuit samples for textural properties

7. Textural evaluation of various food products using texturometer.
8. Simple tests for detection of common adulterants- formaldehyde, starch, cane sugar, hydrogen peroxide, sodium bicarbonate in milk.

### RECOMMENDED READING:

1. Amerine, Pangborn & Roessler, Principles of sensory evaluation of food, Academic Press, London, 1965
2. DeMan, 3rd edition, Principles of Food Chemistry, Springer, 2007.
3. Meilgard, Sensory evaluation Techniques, 3rd ed CRC Press LLC, 1999
4. Yeshajahu Pomeranz & Clifton E. Meloan, Food Analysis & Theory & Practice, 1st Indian ed. CBS Publisher & Distributors, New Delhi, 2002

**BFPS 403** **FOOD ANALYSIS AND INSTRUMENTATION** **4(2+ 2)**

#### Unit - I

**Introduction to food analysis:** Types of samples and sampling techniques, storage and preservation of samples, expression of results.

**Proximate analysis of foods:** Principles of moisture, fat, protein, carbohydrates, crude fiber and vitamins (vit. A and vit. C) in foods.

**Sensory analysis of foods:** Overview of the sensory principles and practices, selection and screening of the sensory panel, types of panel (trained, semi trained), methodology of sensory evaluation- discriminative tests, difference tests, paired comparison, duo trio, triangle; descriptive tests.

#### Unit - II

**Instrumentation in food analysis:** Principles, types and applications of colorimetry and spectroscopy, photometry, electrophoresis, chromatography and atomic absorption spectrophotometry, color measurement in foods, X-ray analysis of foods and its applications, mass spectroscopy, nuclear magnetic resonance (NMR), differential scanning calorimetry (DSC), refractometry and ultrasonics in food analysis, texture analysis in foods- sensory versus instrumental analysis of texture, rapid methods of microbial analysis, immunoassays methods.

#### Recommended Books:

1. Ronald S. Kirk, Ronald, Sawyer, (1991). Pearson's Composition & Analysis of foods, 9th Edition, Longman scientific & Technical, U.K.
2. Pomeranz, Y. & Mrloan (1978). Food Analysis: Theory and Practice, Westport, connectiant: AVI .
3. Amerine, M.A. Pangborn, R.M., and Rosseler, E.B. 1965. Principles of Sensory Evaluation of Food. Academic Press, New York.

BVFP4S4 **WORK INTEGRATED LEARNING** **6(0 + 6)**

Students have to undergo industrial training/ production work for a minimum of 180 hours or 1 month.

#### SEMESTER 5

BVFP5S1 **PROCESS PLANT DESIGN** **3(2 + 1)**

BVFP5S2 **CONFECTIONARY TECHNOLOGY** **3(2 + 1)**

BVFP5SE1 **ELECTIVE 1** **6(4 + 2)**

BVFP5S3 **WORK INTEGRATED LEARNING** **3(0 + 3)**

#### SEMESTER 6

BVFP6S1 **PACKAGING** **4(3 + 1)**

BVFP6S2E2 **ELECTIVE II** **6(4+2)**

BVFP6S3 **PROJECT WORK** **8(0 + 8)**

### B.Voc. (Food Processing and Technology) 1<sup>st</sup> Semester: List of Practicals

#### Fundamentals of Food Science(2+2)

1. Layout plan of the lab and introduction to laboratory rules.
2. Equipments used in cooking
3. Terms used in cooking.
4. Weights and Measures of raw and cooked food.

5. Methods of cooking -
6. Traditional methods – Preparation of any two recipes from the
7. following: a) Boiling b) Roasting c) Frying d) Steaming
8. Modern methods - Preparation of any two recipes from the following:
9. a. Baking b) Solar c) Microwave d) Combination.

### **Food Microbiology (2+1)**

1. Introduction to the Basic Microbiology Laboratory Practises and Equipments
2. Cleaning and sterilization of glassware
3. To study working principle of Autoclave and Microscope.
4. Functioning and use of compound microscope
5. Preparation and sterilization of nutrient broth
6. To prepare the culture media for microbial cultivation.
7. Isolation of pure culture by pour plate method.
8. Identification of micro-organisms by using Gram-staining method.
9. To study the microbial count by using Haemocytometer.
10. To perform Coli form test in the given sample.
11. To study the standard plate count of given sample.
12. Cultivation and sub-culturing of microbes
13. Preparation of slant, stab and plates using nutrient agar
14. Morphological study of bacteria and fungi using permanent slides
15. To study Simple staining
16. To study Gram's staining
17. To study Negative staining
18. To perform Standard Plate Count Method

### **Food Bio Chemistr(2+1)**

1. Preparation of primary and secondary solutions
2. Estimation of moisture content
3. Estimation of total ash
4. Determination of refractive index and specific gravity of fats and oils.
5. Soxhlet extraction of fat
6. Protein estimation by Kjeldhal method
7. Estimation of iodine value
8. Estimation of peroxide value
9. Determination of percent free fatty acids
10. Estimation of saponification value

### **Basic Cereal Technology(3+2)**

1. Physical-tests on wheat and rice; (equivalent diameter, sphericity, angle of repose, terminal velocity, moisture content)
2. Determination of gluten content in wheat flour;
3. Determination of water absorption power (WAP).
4. Physicochemical and rheological properties of dough.
5. Preparation of bakery products-cake,
6. Preparation of plain biscuit,
7. Preparation of short dough biscuits& hard dough biscuits.
8. Preparation of cookies.
9. Preparation of wafers.
10. Preparation of doughnut.
11. Visit to related processing industries.

I Deepak Yadav

I live at Atarra ( Banda) u p

My first time school Tathagat gyansthal se sec school ,Atarra study it from ukg to 3 class.

My second time school Smt Neema devi kala public school ,Roorkee( Haridwar) u k. Class from 3 to 5