

UGC B.Voc.Programmes *St.Teresa's College(Autonomous), Ernakulam*

ST. TERESA'S COLLEGE, ERNAKULAM



**CURRICULUM FOR BACHELOR'S PROGRAMME
IN
B.VOC (FOOD PROCESSING TECHNOLOGY)**

2015 Admission Onwards

ST. TERESA'S COLLEGE ERNAKULAM

B. VOC FOOD PROCESSING TECHNOLOGY

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ACKNOWLEDGEMENT

The Bachelor of Vocation (B.Voc) in Food Processing Technology is a programme formulated under the National Skill Qualification Framework (NSQF) notified by the UGC. This programme will equip the graduates to make a meaningful participation in food industry and enable them to become active entrepreneurs in the field of various Food processing enterprises. This skills development based higher education, leading to Bachelor of Vocation (B.Voc.) Degree has the unique opportunity with multiple exits such as Diploma/Advanced Diploma under the NSQF.

I extend my sincere gratitude to Dr. Sr. Celine. E, Director, St. Teresa's College, for being the source of inspiration and support in the commencement of this programme. A word of sincere appreciation to Dr. Sajimol Augustine M., Principal, St. Teresa's College whose untiring efforts and committed devotion has helped to mould this innovative programme.

I wish to place on record the whole hearted support and expert contributions of members of the Board of Studies in B.Voc Food Processing Technology, Smt. Mini Michael, Mr Vishal Menon, Smt. Anie Thomas and Smt. Nimmi Jacob and Member of Academic Council Mr George Paul, MD, Synthite Industrial Chemicals Ltd., subject experts, industrial experts and the alumni for facilitating expert guidance in structuring the syllabus. Contributions and expertise of faculty members of the Department of Home Science are gratefully acknowledged. I wish to individually thank all the members who have provided valuable suggestions on course structure and content and gratefully acknowledge the unstinted support and guidance extended by all the expert committee members and teachers in formulating the syllabus.

Dr. Sheelamma Jacob K
Chairperson, Board of Studies
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Foreword

Education is the key to achieve sustainable *national development* which will uplift society. Today the educational system is in a phase of transition and a paradigm shift is the need of the hour. The challenge before us is to incorporate necessary changes in the prevalent educational system, and this requires changes in the course curriculum both for under graduation and post-graduation programmes. The strategy adopted for the programmes in the areas of women development involves empowering women through education and giving greater emphasis on vocational training and employability so as to enable them to enter the mainstream of economic development as equal partners. To attain this objective, St. Teresa's College is committed to impart quality education to students by providing some non-conventional, skill based job oriented courses in addition to the existing traditional courses. It is our deep desire that students imbibe knowledge, inculcate a culture of learning and develop the capability to compete for jobs in a global scenario.

This year the College has initiated skill based programmes such as bachelor of vocation (B.Voc.) under the National Skills Qualifications Framework (NSQF) with the support of University Grants Commission (UGC). This would enable the graduates completing B.Voc. to participate in accelerating India's economy by getting appropriate employment, becoming entrepreneurs and creating appropriate knowledge. The college has also laid special emphasis on the expansion of skill based programmes in higher education by introducing a UGC funded Community College, which would offer low cost, high quality education locally, encompassing both vocational skills development as well as traditional coursework, thereby providing opportunities to the learners to move directly to the employment sector or into the higher education sector. The details of the course curriculum and structure are set in accordance with the course specifications given by UGC and that of the affiliating university. I would like to take this opportunity to thank the College Director Dr. Celine. E (Dr. Sr. Vinitha) who has taken the initiative in introducing skill based programmes during her office as the Principal of the College. I specially thank all the faculty members of the Department of Home Science and Computer applications, who have given their time and energy in building the curriculum for the new courses, Diploma in Health Care Assistance and B. Voc. programmes in Food Science Technology and Software Development. With sincere thanks, I acknowledge the support extended by the members of the Governing Council, Dr. Latha Nair, Associate Professor, Department of English, Dr. Kala M.S, Associate Professor, Department of Physics and Dr. Alphonsa Vijaya Joseph, Associate Professor, Department of Botany in framing the overall structure of the courses. We now need to take this endeavour forward as the next step in our journey of deepening, strengthening and spreading our work through engagement, collaboration and partnerships. I wish and hope that our institution will continue to serve the noble purpose for the years to come with glory.

Dr. Sr. Celine. E, Director, and
Dr. Sajimol Augustine M., Principal,
St. Teresa's College

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PREAMBLE

Food processing technology is the set of methods and techniques used to transform raw ingredients into food or to transform into other forms for consumption by humans or animals either in the home or by the food processing industry. The duration of the course is three years. In this course of the study candidates a solid scientific foundation in food chemistry, microbiology, food processing and formulation of agricultural raw materials into safe and nutritious food products. Food processing technology is science which deals with the techniques and principles involved in processing and preserving the food substances. This course is an important one and job oriented in nature that opens many career scopes after its completion.

The programme aims at producing highly trained and skilled food technologist who have career opportunities in both research and fast developing food industry. In the present scenario of globalisation, the food processing technology is continually changing, dynamic profession with long term career prospects including management, research, education and specialised laboratory work. This degree offer future vistas for higher studies and academic staff positions at leading university and research institutes in India and across globe. The students are competent to work in different fields related to food industry on completion of this course.

GRADUATE ATTRIBUTES

- Professional training and skill enhancement in order to provide and widen employment opportunities for women as food technologists.
- Enable students to acquire culinary skills that assist in the enhancement of overall professional attributes.
- To become academically qualified and mature, as enlightened individuals assisting in the achievement of goals.
- Orient students to enhance entrepreneurial competencies.
- Strengthening linkages with food organisations with a view to provide employment opportunities for students and enriching the database in research in all fields.
- Enable the learners to employ acquired knowledge from “lab to land” with extension education in the field of nutrition and health, entrepreneurship development, microbiology consumer and public awareness.
- Educating the individual for highest quality practical training.
- Conducting research to discover the changing needs in the field of food processing.
- To improve the services and goods used by families.
- To enable students to understand food composition.
- To familiarize students about processing, preservation techniques of different food commodities.
- To emphasise the importance of food safety, food quality, laws and regulations, food engineering and packaging in food industry.

UGC Sponsored B.Voc Programmes

The University Grants Commission (UGC) had launched a scheme on 27 February, 2014 for skills development based higher education as part of college/university education, leading to Bachelor of Vocation (B.Voc.) degree with multiple entry and exit points. Considering the implementation modalities, the guidelines of the scheme have been revised in the year 2015. The B.Voc. Programme is focused on universities and colleges providing undergraduate studies which would also incorporate specific job roles and their NOS (Natural Operating Standards)s 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.

1. Objectives

1. To provide judicious mix of skills relating to a profession and appropriate content of general education.
2. To ensure that the students have adequate knowledge and skills, so that they are work ready at each exit point of the programme.
3. To provide flexibility to students by means of pre-defined entry and multiple exit points.
4. To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements. Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.
5. To provide vertical mobility to students coming out of
 - a) 10+2 with vocational subjects;
 - b) Community Colleges.

2. Governance and Coordination

An Advisory Committee will be set-up for effective governance and coordination of the courses under the scheme. The Advisory Committee will include the representative(s) of the affiliating university, relevant industries, relevant Sector Skills Council(s), and Nodal Officer of B.Voc Scheme. The Vice Chancellor of the university or his Nominee or Principal of the college, as the case may be, will be the Chairman of the Advisory Committee and the Nodal Officer will be the Member-Secretary. The Committee will meet periodically to review the functioning of the courses, as and when required, but at least once in six months. The Advisory Committee will also ensure the

timely submission information to UGC and uploading of data in Skill Development Monitoring System (SDMS). Nodal Officer will submit quarterly progress report to UGC and copy of the same may also be endorsed to Head, Standards & Q.A., National Skill Development Corporation, Block A, Clarion Collection, Shaheed Jeet Singh Marg, New Delhi - 110016.

3. Job Roles

Food processing industry is rapidly growing in India and several employment opportunities are available in various industries. There is good scope of food technology courses which offer numerous job opportunities in various areas. One can get jobs in food processing industries, research laboratories, hotels, soft drink factories, quality control, rice mills, manufacturing industries and distilleries.

In India Food Processing industry is gaining momentum as the consumer food industry, which includes ready to eat and ready to cook products, cocoa products, biscuits, soft drinks, beer, alcohol beverages, mineral and packaged water segment of consumer foods is seeing an upward trend.

There are about 300 Million upper and-middle-class consumers of processed and packaged food in the country, and another 200 Million are likely to be added by 2010. Ministry of Food Processing Industries is planning to establish 500 food parks in the Tenth Five Year Plan across every parliamentary constituency. This will give a further boost to the growth and development of food processing industries and thereby is generating a huge job potential for those who have an aptitude for the work and required qualifications. The food processing industry is still at its nascent stage in India. It thus provides ample employment opportunities.

Food technologists, technicians, bio technologists and engineers are required in this industry for the practical application of the principles of many disciplines of science in the manufacturing or production, preservation and packaging, processing and canning of various food products.

The sector skill council for the food processing sector is FICSI (Food Industry Capacity and Skill Initiative). The table below shows the NSQF levels , NOS and QPs of some of the job roles

Qualification Pack	NSQF Level	Total NOS	Role Description
Bread and Bakery Subsector			
Plant Baker	5	5	A Plant Baker produces/ supervises the production of baked products (breads, biscuits, cakes, etc.) in industrial units.
Plant Biscuit Production Specialist	4	5	A Plant Biscuit Production Specialist produces biscuits in industrial units as per defined SOPs in synchronisation with rest of the plant/ unit by weighing, mixing, kneading, rolling/sheeting, cutting, moulding, baking, cooling, etc. either manually or using machineries following the defined SOPs of the plant/ unit.
Mixing Technician	4	5	A Mixing Technician is responsible for preparing different types of dough used in making baked products.
Craft Baker	4	5	Craft Baker produces baked products (breads, puffs, cookies, cakes/pastries, desserts, specialty baked products, etc.) in artisan bakeries and patisseries by measuring raw materials and ingredients, mixing, kneading, fermenting, shaping, and baking in order to achieve the desired quality and quantity of products.
Baking Technician/Operative	4	5	A Baking Technician / Operative is responsible for baking of products, maintaining their consistency and quality, while meeting defined SOPs and leveraging his/ her skill to operate ovens in synchronisation with proof box/ rest of the plant/ unit.
Dairy Products			
Dairy Products Processor	5	6	
Ice Cream Processing Technician	4	5	
Dairy Processing Equipment Operator	4	5	
Butter and Ghee Processing Operator	4	5	
Fish and Seafood			
Fish and Seafood Processing Technician	4	5	

Grain Milling

Chief Miller	6	5
Milling Technician	5	5
Grain Mill Operator	4	5
Pulse Processing technician	4	5

Fruits and Vegetables

Fruit Ripening Technician	4	4	
Fruit Pulp Processing Technician	4	5	
Fruits and Vegetables Canning	4	5	
Fruits and Vegetables Drying/Dehydration Technician	4	5	
Fruits and Vegetables Selection In charge	3	4	
Jam, Jelly and Ketchup Processing Technician	4	5	A Jam, Jelly and Ketchup Processing Technician is responsible for processing fruits and vegetables to make jam, jelly and ketchup.
Pickle Making Technician	4	5	A Pickle Making Technician is responsible for preparing different types of pickles from various fruits and vegetables. This role is similar for processing all types of pickles in manual and machine operated units.
Squash and Juice Processing Technician	4	5	A Squash and Juice Processing Technician is responsible for preparation of squash and juice from fruits.

Miscellaneous

Assistant Lab Technician- Food and Agriculture Commodities	4	5	An Assistant Lab Technician – Food and Agricultural Commodities is responsible for sampling raw materials, packaging materials, finished products, shelf-life samples for quantitative and qualitative analysis.
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modified atmosphere storage technician	4	4	A Modified Atmosphere Storage Technician is responsible for storage of various kinds of produce in a modified atmosphere in the storage unit. S/he carries out processes such as receiving the produce, assessing its quality, pre-cooling, creating ambient temperature, pressure and relative humidity in the modified atmosphere storage unit.
Purchase Assistant Food and Agriculture Commodities	4	4	A Purchase Assistant – Food and Agricultural Commodities is responsible for purchase of food and agricultural commodities. S/he carries out activities such as processing purchase requisitions, raising purchase orders, identifying vendors and raising orders, ensuring timely delivery of orders, and maintaining inventories.
Food Products Packaging Technician	5	5	A Food Products Packaging Technician performs various packaging functions and handles all categories of packaging such as primary, secondary and tertiary packaging for food products.
Cold Storage Technician	4		A Cold Storage Technician is responsible for handling installation of refrigeration system and components, refrigerant charging and storage of food in the cold storage room by maintaining storage parameters such as temperature and relative humidity in food processing units.

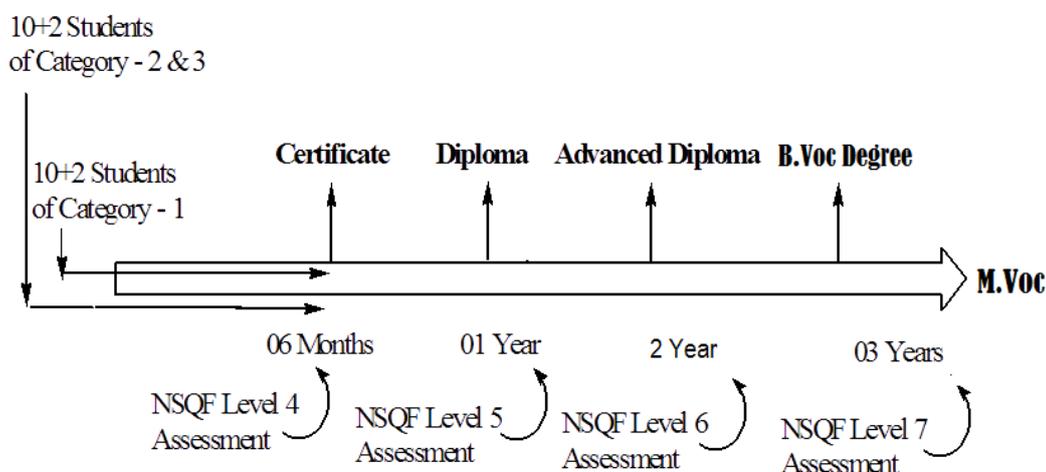


Figure 1 : Assessment of Skill Component under NSQF in Vocational Courses

Awards	Duration	Job Roles
Certificate in Food Processing Technology	6 months	Bakery Technician \ operator, craft baker, mixing technician, plant biscuit production specialist
Diploma in Food Processing Technology	1 Year	Butter and ghee processing operator, dairy processing equipment operator, ice cream processing technician and the all the above
Advanced diploma in Food Processing Technology	2 years	Fish and sea food processing technician, pulse processing technician, grain mill operator and all the above
Degree in Food Processing Technology	3 years	Assistant lab technician food and agricultural commodities, purchase assistant food and agricultural commodities, fruit pulp processing technician, fruit and vegetable canning technician, fruit and vegetable drying\

dehydration technician, fruit and vegetable selection in charge, squash and juice processing technician, jam, jelly, ketchup processing technician, pickle making technician and all the above

Cumulative credits awarded to the learners in skill based vocational courses

NSQF Level	Skill Component Credits	General Education Credits	Total Credits for Award	Normal Duration	Exit Points / Awards
4	18	12	30	One Sem.	Certificate
5	36	24	60	Two Sem.	Diploma
6	72	48	120	Four Sem.	Advanced Diploma
7	108	72	180	Six Sem.	B.Voc Degree

The curriculum in each of the years of the programme would be a suitable mix of general education and skill development components. As is evident from Table 2 above, the General Education Component shall have 40 % of the total credits and balance 60% credits will be of Skill Component. The Curriculum details should be finalized before introduction of the courses.

4. General Assessment

- a. The Skill component of the course will be assessed and certified by the respective Sector skill Councils. In case, there is no Sector Skill Council for a specific trade, the assessment may be done by an allied Sector Council or the Industry partner. The certifying bodies may comply with and obtain accreditation from the National Accreditation Board for Certification Bodies (NABCB) set up under Quality Council of India (QCI). Wherever the university/college may deem fit, it may issue a joint certificate for the course(s) with the respective Sector Skill Council(s).
- b. The credits for the skill component will be awarded in terms of NSQF level certification which will have 60% weightage of total credits of the course in following manner.

Name of the Course	NSQF Level Certificate	Cumulative Credits
Certificate	Level – 4	18 credits
Diploma	Level – 5	36 credits
Advanced Diploma	Level – 6	72 credits
B.Voc Degree	Level – 7	108 credits

The general education component will be assessed by the concerned university as per the prevailing standards and procedures. The following formula may be used for the credit calculation in general education component of the courses:

General Education credit refers to a unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week. Accordingly, one Credit would mean equivalent of 14-15 periods of 60 minutes each or 28 – 30 hrs of workshops / labs.

For internship / field work, the credit weightage for equivalent hours shall be 50% of that for lectures / tutorials.

For self-learning, based on e-content or otherwise, the credit weightage for equivalent hours of study shall be 50% of that for lectures / tutorials.

5. Duration of the Course

Duration of B.Voc Food Processing Technology programme shall be 6 semesters distributed over a period of 3 academic years. Each semester shall have 90 working days inclusive of all examinations.

6. Nature of the Course

- No open course is envisaged
- No Electives are included
- Total credits is 180
- Working hours per week is 30 hours
- All vocational subjects are treated as core course.
- Multiple exit points are permitted, that is, if willing, candidate can quit after the successful completion of first & second year. Candidate do so, can't be re-entered
- .There will not be provisions for improvement.

A candidate who failed in a semester may get two supplementary chances. Only failed papers are to be written in the supplementary examination.

7. Programme Structure

The B.Voc Food Processing Technology shall include:

- a. Language courses (English)
- b. General Education Components
- c. Skill Components
- d. Internship
- e. Field Visits
- f. Project
- g. Soft Skills and Personality Development Programmes
- h. Study tours

8. Scheme of Courses

Scheme of distribution of credits for courses

<u>Courses</u>	<u>No.</u>	<u>Credits</u>
General courses	19	72
Skill courses	20	88
Project	1	10
Internship	5	10
Total	45	180

Course Code

The first letter of the code indicate the nature of the course that is v for vocational, the second two letters denote name of the course FP(Food Processing), one digit indicates the semester VFP1 for 1st semester, one letter to indicate the type of course(S for Skill and G for General) and a two digit code to indicate the number of the course., the letter T/P to indicate if it is theory or practical. The Last letter B indicates that it is a Bachelors program

Credit Distribution

<u>Semester</u>	<u>Paper</u>	<u>Type of Course</u>	<u>No. of Credits</u>	<u>No. of hours per semester</u>	<u>Total Credits/ semester</u>	<u>Classes per week</u>
1	Food Chemistry	Skill	5	60	18(Skill)	5
	Principles of Food Preservation	Skill	5	60		5
	Bakery and Confectionary Technology	Skill	5	60		5
	Baking and Confectionary Technology (practical)	Skill	2	60		3
	Internship	Skill	1	30		
	Communication Skills in English	General	4	60	12(General)	4
	Food Science and Nutrition I	General	4	60		4
	Entrepreneurship Development & Project Management	General	4	60		4
2	Dairy Technology	Skill	5	60	18(Skill)	6
	Packaging technology	Skill	5	60		5
	Sanitation and hygiene	Skill	5	60		4
	Analysis of Milk and Food Chemistry Practical's	Skill	2	60		3
	Internship	Skill	1	30		
	Academic Writing & Presentation	General	4	60	12(General)	4
	Food Science & Nutrition-II	General	4	60		4
	Business Studies	General	4	60		4
3	Technology of Fish, Meat and Egg Products	Skill	5	60	18(Skill)	5
	Technology of Spices	Skill	5	60		5
	Fermented Foods	Skill	5	60		5
	Internship	Skill	3	90		
	Food Microbiology	General	4	60	12(General)	4
	Food Microbiology Practical's	General	2+2	60		7
	Marketing Management	General	4	60		4

<u>Semester</u>	<u>Paper</u>	<u>Type of Course</u>	<u>No. of Credits</u>	<u>No. of hours per semester</u>	<u>Total Credits/ semester</u>	<u>Classes per week</u>
4	Cereal, Pulses and Oilseed Technology (Milling)	Skill	5	60	18(Skill)	5
	Technology of Beverages	Skill	5	60		5
	Unit Operations in Food Industry	Skill	5	60		5
	Internship	Skill	3	60		
	Microbiology Practical II	General	3	90	12(General)	7
	Environmental Studies & Waste Management	General	4+2	60		4
	Product & Brand Management	General	4	60		4
5	Food Quality Assurance	Skill	5	60	18(Skill)	5
	Fruit and Vegetable Processing	Skill	5	60		6
	Food Toxicology	Skill	5	60		4
	Food Processing Practical's	Skill	1	30		3
	Internship	Skill	2	60		
	Computer Applications	General	4	60	12(General)	4
	Computer Applications Practical's	General	4	60		4
	Business Communication	General	4	60		4
6	Food Analysis and Adulteration	Skill	5	60	18(Skill)	4
	Food Analysis and Adulteration Practical's	Skill	3	90		6
	Project & Viva – voce	Skill	10	120		8
	Sensory Evaluation of Foods	General	4	60	12(General)	4
	Analytical Instrumentation	General	4	60		4
	Analytical Instrumentation Practical's	General	2	60		4
	Personality Development, Interview Skills, Mock Interview, Library	General	2			

9. Assessment

The evaluation of each course shall contain two parts- Sessional Assessment and Final Assessment. The Sessional and Final Assessment shall be made using a Mark-Based Grading System on a 7-point scale. Overall Sessional: Final ratio will be maintained as 20:80.

Sessional

The Sessional evaluation is to be done by continuous assessment of the following components. The components of the evaluation for theory and practical and their weights are as below.

I. Distribution of sessional marks:

a. For Theory courses,

- Attendance - 5 marks
- Assignment - 5 marks
- Test paper - 10 marks

Total :- 20 marks

b. For Practical,

- Attendance - 3 marks
- Record - 5 marks
- Test Paper -10 marks
- Lab involvement - 2 marks

Total:- 20 marks

II. Attendance Evaluation

A student should have a minimum of 75% attendance. Those who do not have the minimum requirement for attendance will not be allowed to appear for the Final Examinations.

Distribution of Marks for evaluation

- 90% - 100% - 5marks
- 85% - 89% - 4 marks

- 80% - 84% - 3 marks
- 75% - 79% - 2 marks

III. Assignment/Seminar/Viva

- 1st to 5th semesters - Assignment/Seminar
- 6th semester - Seminar only

Test Paper

- Average mark of two sessional examinations shall be taken.

Final

The final examination of all semesters shall be conducted by the institution on the close of each semester. For supplementary, students may appear along with the next batch.

Pattern of Questions

Questions shall be set to assess knowledge acquired, application of knowledge in life situations, critical evaluation of knowledge and the ability to synthesize knowledge. The question setter shall ensure that questions covering all skills are set. She/he shall also submit a detailed scheme of evaluation along with the question paper.

A question paper shall be a judicious mix of very short answer type, short answer type, short essay type / problem solving type and long essay type questions.

The pattern of questions for these courses without practical are listed below.

1. Each question paper has four parts A, B, C & D.
2. Part A contains 6 questions of 1 mark each all of which the candidate has to answer.
3. Part B contains 10 short answer type questions spanning the entire syllabus and the candidate has to answer 7 questions. Each question carries 2 marks.
4. Part C contains 8 problem type questions / short essays spanning the entire syllabus and the candidate has to answer 5 questions. Each question carries 6 marks. But, for open courses, Part C contains short essay type questions only.
5. Part D contains 4 essay type questions spanning the entire syllabus and the candidate has to answer 2 questions. Each question carries 15 marks.
6. The total mark for courses is 80.

Practical Examinations

The practical examinations for the core and complementary courses are to be conducted at the end of every even semesters by the institution. The external examiner shall be selected

by the institution. The score sheet should be sent to the Controller of Examinations soon after the evaluation.

A minimum of 16 experiments should be done in a practical course and a candidate submitting a certified record with a minimum of 8 experiments alone is eligible for appearing for the Practical Examination.

Evaluation

The scheme of evaluation of the practical examination will be decided by the Board of Examiners.

Student strength for practical examination:

There shall be at least one teacher to supervise a batch of not more than 15 students in each laboratory session.

Project Evaluation

All students have to begin working on the project in the **FIFTH** semester and must submit it in the **SIXTH** semester.

Sessional Evaluation

For Project

The ratio of Sessional to Final component of the project is 1:4. The mark distribution for assessment of the various components is shown below.

1. Sessional Evaluation: 10 marks

Component	Marks
Punctuality	2
Experimentation/ Data collection	4
Compilation	2
Group involvement	2

2 External Evaluation of Project: 25 marks

Component	Marks
Introduction and objectives	5
Review of Literature	5
Materials & Methods	10
Results & Discussion / Applications	5

3 Viva –Voce on Project: 15 marks

Letter Grades and Grade points: The UGC recommends a 10 point grading system with the following letter grades as given below:

Grades and Grade points

Letter Grades	Grade points
O (Outstanding}	10
A+ (Excellent)	9
A(Very Good)	8
B+(Good)	7
B (Above average)	6
C(Average)	5
P (Pass)	4
F (Fail)/ Ab (Absent)	0

Computation of SGPA and CGPA

Credit point and credit point average

Credit Point (CP) of a course is calculated using the formula

$$CP = C \times GP, \text{ where } C = \text{Credit for the course}; GP = \text{Grade point}$$

Semester Credit Point Average (SGPA) is calculated as

$$SCPA = \frac{\text{Total Credit Points (TCP)}}{\text{Total Credits (TC)}}$$

where TCP = Total Credit Point; TC = Total Credit

Cumulative Credit Point Average for the programme is calculated as follows:

$$\text{CCPA} = \frac{(TCP)_1 + (TCP)_2 + \dots + (TCP)_6}{TC_1 + TC_2 + \dots + TC_6}$$

Where **TCP₁...**, **TCP₆** are the **Total Credit Points** in each semester and **TC₁...**, **TC₆** are the **Total Credits** in each semester

Note: A separate minimum of **30% marks** each for Sessional and Finals (for both theory and practical) and an aggregate minimum of **40% is** required for the pass of a course. For pass in a programme, a separate minimum of Grade E is required for all the individual courses. If a candidate secures **F** Grade for any one of the courses offered in a Semester/Programme only **F** grade will be awarded for that Semester/Programme until he/she improves this to **E** grade or above within the permitted period. Candidate who secures **D** grade and above will be eligible for higher studies.

The evaluation of all components shall be published by the department and shall be acknowledged by the candidate. All documents of the assessment will be retained in the department for 2 years and be made available for verification.

9. Eligibility for Admission

Eligibility for admissions and reservation of seats for B.Voc shall be according to the rules framed by the University from time to time. No student shall be eligible for admission to B.Voc unless he/she has successfully completed the examination conducted by a Board/ University at the +2 level of schooling or its equivalent in stream.

The total no of seats allotted is 50.

10. Detailed Syllabus**Semester-1****Core Course****Food Chemistry****60 Hours****Course Code**VFP1S01TB**Classes/week** 5**Objectives**

To study about the major and minor components of food and their properties

Module 1: Introduction to Food Chemistry and Water: 5 hours

moisture in foods, free water, bound water, hydrogen bonding, water activity, effect of hydrogen bonding on the properties of water, water hardness.

Module 2: Carbohydrates 12 hours

Properties and classification, composition, sources, structure ,reactions, functions of mono, oligo - and polysaccharides in food, starch, cellulose, pectic substances, gel formation, starch degradation, dextrinization , qualitative and quantitative tests.

Module 3: Proteins 10 hours

Composition, Classification, Sources, Essential and non-essential amino acids, Physical and chemical properties of proteins and amino acids, confirmation, functional properties, denaturation, hydrolysis, gelatine, changes in proteins during processing, qualitative and quantitative tests.

Module 4: Fats and oils 14 hours.

Nomenclature, composition, classification, essential and non- essential fatty acids, sources, physical and chemical properties, hydrolysis, hydrogenation, rancidity and flavour reversion, emulsion and emulsifiers. Saponification value, acid value and iodine value, smoke point, fire point.

Module 5: Pigments, colours and flavours in food 9 hours

Pigments indigenous to food, Structure, chemical and physical properties, effect of processing and storage. Colours added to foods, flavours- Vegetable, fruit and spice flavours.

Module 6 Enzymes

10 hours

Nomenclature, Specificity, catalysis regulation, factors influencing enzymatic activity, controlling enzyme action, enzymes added to food during processing, modification of food by endogenous enzymes. Enzymes inhibitors in foods.

Reference Books:

- 1) Manay, N.S. Shadaksharaswamy, M. Foods- Facts and Principles, New age international publishers, New Delhi, 2004.
- 2) Bender, A.E. Food Processing and Nutrition. Academic Press, London.1978
- 3) Heimann, H.E. Food Chemistry Academic Press, London.1978
- 4) Meyer, L.H.- Food Chemistry. CBS publishers and Distributors, New Delhi,2002.

Competency of the course:

To understand the major components of food.

To know about the changes that occurs in them during processing.

To study their classification, structure and chemistry.

To understand the changes that occurs in the different constituents during storage and ways and means to prevent it.

Blueprint

Module	Part A (1 mark) 6/6	Part B (2 marks) 7/10	Part C (6 marks) 5/8	Part D (15 marks) 2/4	Total 80
1	1	2	2		17
2	1	2	1	1	26
3	1	2	1	1	26
4	1	1	1	1	24
5	1	1	1		9
6	1	2	2	1	32

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TECHNOLOGY
SEMESTER I
MODEL QUESTION PAPER**

COURSE CODE – VFP1S01TB

COURSE TITLE – Food Chemistry

Time: Three Hours

Maximum Marks: 80

Part A

(Short Answer Questions)

Answer **all** questions

Each question carries **1 mark**

1. What is water activity?
2. Which is the carbohydrate present in milk?
3. What are the essential amino acids?
4. What do you mean by rancidity?
5. Give any two examples of enzymes and their action?
6. What do you mean by enzyme specificity?

(6 × 1 = 6 marks)

Part B

(Brief Answer Questions)

Answer any **seven** questions

Each question carries **2 marks**.

7. Give the precautions to be taken in estimation of moisture by oven drying method.
8. What is the difference between free water and bound water?
9. Draw the structure of sucrose.
10. What is the difference between soluble fibre and crude fibre?
11. What do you mean by the primary structure of protein?
12. What is meant by biological value of a protein?
13. What is the difference between fats and oils?
14. Which is the flavour pigment present in cabbage?
15. What do you mean by enzymatic browning?
16. Draw the structure of any one compound responsible for enzymatic browning
(7 x 2=14marks)

Part C

Answer any **five** questions

Each question carries **6 marks**

17. Explain the toluene distillation method for estimation of moisture in foods.
18. How does hydrogen bonding effects the properties of water?
19. Explain the Lane and Eynons method for estimation of reducing sugar.
20. Explain denaturation.
21. Describe smoke point and fire point and give its importance.
22. Write a short note on effect of water activity on food spoilage.
23. Discuss the mechanism enzymatic browning.
24. Discuss the importance of enzymes in food processing.
(6×5=30 marks)

Part D

Answer any **two** questions

Each question carries **15 marks**

25. Write an essay on the structure of proteins.
26. Explain the process of gelatinization of starch and the factors responsible for starch gelatinization
27. Explain the mechanism of enzymatic action?
28. Explain the importance of RM value and give the method of determination of it?
(2 × 15=30 marks)

Principles of Food preservation

60 hours

Course codeVFP1S02TB

Classes/week 5

Objectives

To study the different ways in which food spoilage occurs and the techniques to prevent it

Module 1- Food Spoilage

10 Hours

Definition, types of spoilage-physical, enzymatic, chemical and biological .

Module 2- Basic Principles of Food Preservation

10 Hours

Definition, principles and importance of food preservation, general classification on the methods of food preservation

Module 3- Preservation by use of High Temperature and high pressure

10 Hours

Pasteurization, sterilization, canning-history and steps involved types of cans and bottles. Spoilage encountered.

Module 4- Preservation by use of Low Temperature

10 Hours

Refrigeration- Advantages, mechanism of refrigeration factors to be considered during chilling, difference between refrigeration and freezing, methods of freezing, steps involved in freezing, types of freezing, common spoilage during freezing.

Module 5- Preservation by Removal of Moisture

12 Hours

Drying and dehydration-merits and demerits, factors affecting drying, preparation of food for drying, Freeze drying, dehydrofreezing - advantages, mechanism of freeze drying and dehydrofreezing, Concentration, principles and types of concentrated foods.

Module 6- Preservation by irradiation and use of preservatives

8 Hours

Principles of food irradiation, Class I and Class II preservatives

Reference Books

1) Manay, N.S. Shadaksharaswamy, M. Foods-Facts and Principles, New age international publishers, New Delhi, 2004.

2) Bender, A.E. Food Processing and Nutrition. Academic Press, London.1978

3) Branen, A.L., Davidson, P.M., Salminen, S. Food Additives, Marcel Dekker Inc. New York

Competency of the course:

To understand the principles behind the various methods of food preservation

To know how to use these principles to preserve different types of foods

To study the method of action of different preservatives

To understand how food spoils.

To know the different spoilage agents and the ways in which they act on foods to spoil it

Blueprint

Module	Part A (1 mark) 6/6	Part B (2 marks) 7/10	Part C (6 marks) 5/8	Part D (15 marks) 2/4	Total
1	1	1	1	1	26
2	2	2	1	-	12
3	1	2	1	1	26
4	-	2	2	1	31
5	1	1	2	1	30
6	1	2	1	-	11

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MODEL QUESTION PAPER**

COURSE CODE – VFP1S02TB

COURSE TITLE – Principles of Food Preservation

Time: Three Hours

Maximum Marks: 80

Part A (Short Answer Questions)

Answer **all** questions

Each question carries **1 mark**

1. List out the benefits of food preservation.
2. Define food spoilage.
3. List out benefits of drying.
4. Define the term food processing.
5. Discuss on Radura.
6. Define sterilization.

(1 × 6=6 marks)

Part B (Brief Answer Questions)

Answer any **seven** questions

Each question carries **2 marks**.

7. What is meant by asepsis?
8. Explain on food irradiation.
9. List out the principles of food preservation.
10. Discuss on enzymatic browning.
11. Write on difference between refrigeration and freezing.
12. What is meant by the term concentration?
13. Distinguish between class I and class II preservatives
14. Explain the term pasteurization and methods of pasteurization..
15. Briefly write a note on types of cans.
16. Difference between drying and dehydration

(2 x 7=14 marks)

Part C

Answer any **five** questions

Each question carries **6 marks**

17. Discuss the importance food fermentation.
18. Explain the principles of concentration and types of concentrated foods.
19. Explain merits and demerits of drying?
20. Discuss on enzymatic food spoilage.
21. Explain the steps involved in freezing, types of freezing.
22. Discuss in detail on class II preservatives?
23. Explain the process of canning?
24. Explain on mechanism of refrigeration.

(5×6=30 marks)

Part D

Answer any **two** questions

Each question carries **15 marks**

25. Write an essay on preservation by low temperature.
26. Explain about food spoilage and types of spoilage.
27. How does drying helps in preservation. Explain the merits and demerits of drying.
28. Discuss on preservation by use of high temperature.

(2 × 15=30 marks)

Bakery and Confectionary Technology

Course Code VFP1S03 TB

Classes/week 5 60 hours

Objectives

To highlight the processing methods used in baking and confectionary industries

Module- 1 Manufacture of Sugar 10 hours

Sugarcane, gur, Khandasari sugar, raw sugar, refined sugar, white sugar, beet sugar. Sugar cookery

Module- 2 Classification of confectionary 15 hours

Sugar boiled confectionery- crystalline and amorphous confectionery, rock candy, hard candy, lemon drop, china balls, soft candy, lollypop, marshmallows, fondant, fudge, cream, caramel, toffee, lozenges, gumdrops, honeycomb candy.

Module- 3 Cocoa processing 5 hours

Processing of cocoa, manufacture of chocolate- conching, enrobing, milk chocolate, white chocolate, dark chocolate, cocoa butter, wafer coated chocolate, fat bloom, cocoa powder.

Module -4 Principles of baking 10 hours

Major baking ingredients and their functions

Module- 5 Bread manufacturing 10 hours

Ingredients, role of ingredients, dough development, moulding, proofing, knock-back, baking, packing.

Module- 6 Cake and Biscuit 10 hours

Processing of cake and biscuit-Ingredients, role of ingredients, development of batter, baking, and packing.

Reference books:

1. Durbey, S.C. Basic Baking: Science and Craft. Gujarat Agricultural University, Anand (Gujrat).1979
2. Kent, N.L. 1. Technology of Cereals. 3rdedn. Pergamon Press, Oxford, UK 1983.
3. Mathews, R.H. Ed. Legumes: Chemistry, Technology and Human Nutrition. Marcel Dekker, New York.1989
4. Pomeranz, Y. Modern Cereal Science and Technology. VCH Pub., New York.1987

5. Salunkhe, D.K., Kadam, S.S. and Austin A. Ed. Quality of Wheat and Wheat Products. Metropolitan Book Co., New Delhi 1986

Competency of the course:

To know about the various types of food products made using baking technology

To have a basic idea about baking and confectionery manufacture, and quality control

To know about the importance of each ingredient and how it effects the overall product and its sensory and quality parameters

To be able to start a small scale bakery and confectionery unit

Blueprint

Module	Part A (1 mark) 6/6	Part B (2 marks) 7/10	Part C (6 marks) 5/8	Part D (15 marks) 2/4	Total 80
1	1	2	2		11
2	1	1	1		9
3	1	2	1	1	26
4	1	2	1	1	26
5	1	1	1	1	18
6	1	2	2	1	32

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MODEL QUESTION PAPER**

COURSE CODE – VFP1S03TB

COURSE TITLE – Bakery and Confectionary Technology

Time: Three Hours

Maximum Marks:80

Part A

(Short Answer Questions)

Answer **all** questions

Each question carries **1 mark**

- 1 What is invert sugar?
- 2 What are hard boiled sweets?
- 3 What is the chemical name of baking powder ?
- 4 Which is the commonly used enzyme in biscuit dough development.?
- 5 What is the percentage of water in sugar cane?
6. Which type of flour is used in bread manufacture is ?

(1 × 6=6 marks)

Part B

(Brief Answer Questions)

Answer any **seven** questions
Each question carries **2 marks**.

- 7 Write a note on the role of vacuum pans?
- 8 Give characteristics of liquid sugar?
- 9 Name any three characters of a good bread making flour.
- 10 Define sugar refining.
- 11 State the properties of granulated and liquid sugar.
- 12 What is the action of enzyme amylase on wheat?
- 13 What is caramel?
- 14 Give the principle of baking.
- 15 What do you mean by leavening action?
- 16 Give the characteristics of cocoa butter
- 17 What is the difference between chocolate and artificial chocolate?

(7 x 2=14 marks)

Part C

Answer any **five** questions
Each question carries **6 marks**

- 18 Summarize the straight dough system and sponge dough system of bread making.
- 19 Write on biscuit manufacture.
- 20 Write a note on lollypops?
- 21 Explain the filtration process of cane juice?
- 22 Write a note on bread improvers.
- 23 Write on the different stages of sugar cookery and its applications?
- 24 Explain the processing of cocoa?

(5×6=30 marks)

Part D

Answer any **two** questions
Each question carries **15 marks**

- 25 Give an account of the process of granulated sugar manufacture.
- 26 Describe the process flow chart for production of lozenges.
- 27 Discuss the process of dough making in bread with special emphasis on importance of each ingredient.
- 28 Illustrate the cake manufacturing process with suitable examples and diagram

. (2 × 15=20 marks)

Bakery and confectionery practical's

Course code VFP104PB

Classes per week 3

60 hour

Preparation of jams, jellies, preserves, and candies.

Preparation of different types of bread, biscuits and cakes, sugar cookery

Course competency

To improve the culinary skills of the students

To gain knowledge about the preparation of some basic food products

To use the processes studied in food chemistry and food preservation papers to prepare different food products

To understand how these can be utilized to start a small scale processing unit.

It involves not only how to make a food but also studies the principles behind them.

It helps them to gain not only theoretical but also practical knowledge

General Paper

Communication Skills in English (Adopted from existing M. G. University Syllabus)

Course code VFP1G01TB

Classes per week 4

60 Hours

Objectives

To introduce the students to the speech sounds of English in order to enable them to listen to English and speak with global intelligibility.

To enable the students to speak English confidently and effectively in a wide variety of situations.

To help the students to improve their reading efficiency by refining their reading strategies.

Module 1- Speech Sounds

16 Hours

Phonemic symbols – Vowels – Consonants – Syllables – Word stress – Stress in polysyllabic words – Stress in words used as different parts of speech – Sentence stress – Weak forms and strong forms – Intonation – Awareness of different accents: American, British and Indian – Influence of the mother tongue

Module 2-Listening 12 Hours

Active listening –Barriers to listening – Listening and note taking – Listening to announcements – Listening to news on the radio and television.

Module 3-Speaking 30 Hours

Word stress and rhythm – Pauses and sense groups – Palling and rising tone – Fluency and pace of delivery – Art of small talk- Participating in conversation – Making a short formal speech – Describing people, place, events and things – Group discussion skills and telephone skills.

Module 4- Reading 14 Hours

Reading: Theory and Practice – Scanning – Surveying a textbook using an index – Reading with a purpose – Making prediction – Understanding text structure – Locating main points – Making inferences – Reading graphics – Reading critically – Reading for research.

Reference Books:

1. Communication Skills in English, Cambridge University Press and Mahatma Gandhi University V. Sasikumar, P. Kiranmai Dutt and Geetha Rajeevan.
2. A course in Listening and Speaking I and II, Sasikumar V , Kiranmai Dutt and Geetha Rajeevan, New Delhi: CUP, 2007.
3. Study Listening: A Course in Listening to Lectures and Note taking Tony Lynch New Delhi: OUP, 2008.
4. Study Speaking: A course in Spoken English for Academic Purposes, Anderson, Kenneth, Joan New Delhi: OUP, 2008.
5. Study Reading: A course in Reading Skills for Academic Purposes, Glendinning, Eric H. And Beverly Holmstrom New Delhi: CUP, 2008.
6. Communication Studies: Sky Massan Palgrave, Macmillan, Effective Communication for Arts and Humanities Students Joan Van Emden and Luciada Becker Palgrave Macmillan.
7. Effective Communication for Arts and Humanities Student Joan Van Emden and Lucinda Becker Palgrave Macmillan.

Course competency

To be able to express ones ideas and communicate effectively

To improve pronunciation and phonetics

To improve their soft skills and help in developing their personality and confidence

Knowledge of good English is essential in this fast developing work

Food Science and Nutrition I

Course code VFP1G02TB

Classes per week 4

60 Hours

Objectives

To understand the different types of food products

To Know and understand the functions, importance of all nutrients present in foods

Module 1: Introduction to nutrition 8 hours

Inter-relationship between nutrition and health, visible symptoms of good health. adequate optimum and good nutrition , malnutrition, understand the relationship between nutrition and human well being

Module 2: Food guide and Water as a nutrient 7 hours

Water as a nutrient, function, sources, requirement, water balance, effect of deficiency. Basic five food groups- how to use food guide pyramid.

Module 3: Vitamins 15 hours

Classification, structure, function, sources, general causes for loss in foods, bioavailability, enrichment, fortification and restoration. Units of measurement, functions and deficiency diseases.

Module 4: Minerals 10 hours

Functions, sources, bioavailability and deficiency of the following minerals- Calcium, Iron, Iodine, Fluorine, Sodium, Potassium.

Module 5: Use of food in body, energy utilization, acid- base balance 15 hours

Digestion, absorption, transport, utilization of nutrients in the body. Units of energy, food as a source of energy, energy value of food. The body's need for energy, B.M.R, Total energy Requirement.

Module 6: Classification of food 5 Hours

Definition of food, classification of foods based on origin, pH, nutritive value, function of foods, health foods, ethnic foods, organic foods, functional foods, nutraceuticals, fabricated foods, extruded foods, convenience foods, junk foods, GM foods

Reference Books

1. Hui, Y H and Associates Editors, Handbook of Food Products Manufacturing Vol. I Wiley- Interscience, New Jersey 2007.

2. Hui, Y H and Associates Editors, Handbook of Food Products Manufacturing Vol.II , Wiley- Interscience, New Jersey 2007.
3. Potter, N.N.,Hotchkiss. J.H. Food Science. Cbs Publishers, New Delhi 2000.
4. Srilaxmi, B. Food Science 3rd Edition, New Age International (P) limited Publishers. New Delhi, 2003
5. Guthrie, Hele, Andrews, Introductory Nutrition, 6th ed. St. Louis. Times Mirror\Mosby Collage, 1988.
6. Mudambi S.R. M.V. Rajoopal. Fundamentals of Foods and Nutrition (2nd Ed.) Wiley Easter Ltd., 1990.
7. Swaminathan S.: Advanced text book of Food Nutrition Vol. I.II (2^{ns} ed. revised and enlarged) B.appC.1985.
8. Willson. EVAD Principles of Nutrition, 4th Ed. New York John Willey and Sons. 1979.

Competency of the course:

To know about the various types of nutrients and their functions in the body

To have a basic idea about the nutrients and their functions in food and the changes that occur in them due to processing

A study is also done on the deficiency diseases that occur due to the lack of these nutrients

Food guide study helps to adjust our diet so that we get adequate amounts of all the nutrients

A study of food science helps us to understand the commonly heard terms like GM foods, nutraceuticals etc.

Blueprint

Module	Part A (1 mark) 6/6	Part B (2 marks) 7/10	Part C (6 marks) 5/8	Part D (15 marks) 2/4	Total
1	1	1	1	1	24
2	1	1	1	-	9
3	1	3	2	1	34
4	1	1	1	1	24
5	2	2	1	1	27
6	-	1	2	-	14

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MODEL QUESTION PAPER**

COURSE CODE: VFP1G02TB

COURSE TITLE : FOOD SCIENCE AND NUTRITION I

Time: Three Hours

Maximum Marks: 80

Part A

(Short Answer Questions)

Answer **all** questions

Each question carries **1 mark**

1. Define the terms nutrients and nutrition.
2. Which are the Units of energy?
3. What is the importance of Food guide pyramid?
4. Illustrate the Classification of vitamins.
5. Define BMR.
6. List out the functions of Calcium.

(1 × 6=6 marks)

Part B

(Brief Answer Questions)

Answer any **seven** questions

Each question carries **2 marks**.

7. What is meant by bioavailability of vitamins?
8. What are functional foods? Give examples.
9. List out different types of food with examples.
10. Write a note on major functions and sources of Iodine.
11. List out the sources of water soluble vitamins.
12. Explain the major functions of food.
13. Write a note on water balance.
14. What is meant by the term Respiratory quotient?
15. Discuss on the role of vitamin D in calcium absorption.
16. Write a note on health and its different dimensions.

(7 x 2=14 marks)

Part C

Answer any **five** questions

Each question carries **6 marks**

17. Discuss the sources and functions of Vitamin A.
18. Explain the process of digestion and absorption of macronutrients.
19. Define malnutrition and its types.
20. What is meant by the term convenience food?
21. Explain the functions of water and its distribution in the body.
22. What is the major role of B vitamins in energy metabolism?
23. Explain significance of potassium and sodium in human body.
24. Explain on GM foods. List out its advantages and disadvantages.

(5×6=30 marks)

Part D

Answer any **two** questions

Each question carries **15 marks**

25. Write an essay on role of vitamins as co – enzymes with suitable examples.
26. How is Iron absorbed in the body? Write on effects of iron deficiency.
27. Explain about BMR and factors affecting BMR.
28. Discuss on the inter - relationship between nutrition and health.

(2 × 15=30 marks)

Entrepreneurship development and project management

Course code VFP1G03TB

Classes per week4

Hours: 60

MODULE-1 Entrepreneurship: Meaning, Definition and concepts, characteristics, Functions - Entrepreneurial traits and Motivation - Role of entrepreneur in economic development - Factors affecting entrepreneurial growth. 8 Hours

MODULE-2 Types of entrepreneurs- Entrepreneurship -Women entrepreneurship, significance, Problems, solutions to the problems 4 hours

MODULE-3 EDP (Entrepreneurial Development Programme): objectives, Steps, Need for training- target group- Contents of the training programme-Special Agencies for Entrepreneurial Development and Training-DIC. 10 hours

MODULE-4 Project :Meaning Features-Classification-Project identification-Sources of 36 Ideas-Stages in project identification -Project Life Cycle-Project formulation-elements, Feasibility Analysis-Network Analysis-Project Planning 8 hours

MODULE-5 Setting up of micro small and medium enterprises, location significance, Green channel, Bridge capital, Seed capital assistance, Margin money scheme, Sickness, Causes-Remedies 10 hours

MODULE-6 Role of institutions/schemes in entrepreneurial development-SIDCO, SIDBI, NIESBUD, EDII,SISI, NREG Scheme- SWARNA JAYANTHI Rozgar Schemes. (Brief study only) 10 hours

Reference Books

1. M.M Abraham :Entrepreneurship Development and Project Management
2. Desai, Vasant: Dynamics of entrepreneurial development and management.
3. Drucker, Peter F: Innovation and Entrepreneurship
4. Gupta C.B., Srinivasan N.P: Entrepreneurship Development in India
5. Arora, Renu., Sood S.K : Entrepreneurial Development and Management
6. Khanka, S.S: Entrepreneurial Development

Competency of the course:

To know about the various procedures for starting a small scale unit of production

To have a basic idea about how to prepare a project to start a small scale industry

To know about the various agencies that can provide assistance for starting a new project

Semester II

Core Course

Diary technology

Course codeVFP2S05 TB

Classes per week 6

60 Hours

Objectives

To understand the products which can be made from milk, their processing and storage?

Module 1 Introduction 8hours

Definition, sources, and composition of milk, factors effecting composition of milk, physiochemical properties of milk constituents, collection and transportation of milk, grading of milk

Module 2: Processing of market milk 20 hours

Standardization, toning of milk, homogenization, pasteurization, sterilization, storage, transportation and distribution of milk.

Module 3: Milk product processing 20 hours

cream, butter oil, cheese, cheese spread, condensed milk, evaporated milk, whole and skimmed milk powder, ice cream, Instantiations of milk and milk products

Module 4: Indigenous milk products 5 hours

khoa, channa, panner,

Module 5: Fermented milk products. 5 hours

Yoghurt, *dahi shrikhand* and similar products.

Module 6:In-plant cleaning system. 2 Hours

Reference Books

1 Considine, D.M. Ed.. Foods and Food Production Encyclopaedia, VNR, New York.1982

2 Dey, S.. Outlines of Dairy Technology. Oxford Univ. Press, New Delhi.1994

3 MaCrae, R., Robinson, R.K. and Sadler, M.J. Ed. Encyclopaedia of Food Science, Food Technology and Nutrition Academic Press, London.1993

4 Robinson, R.K. (2 vol. set). Modern Dairy Technology Elsevier Applied Science, UK 1986.

5 Rosenthal, I. Milk and Milk Products. VCH, New York.1991

6 Warner, J.M. . Principles of Dairy Processing. Wiley Eastern Ltd. New Delhi.1976

7 Yarpar, WJ. and Hall, C.W. Dairy Technology and Engineering AVI, Westport.1975

Competency of the course:

To know about the various types of food products made out of milk, their processing , packaging and quality control

To have a basic idea about their processing and about products which can be made from it at a small scale

To know their quality parameters.

To be able to perform the platform tests

Packaging technology

Course Code VFP2S06TB

Hours per week 5

60 hours

Objectives

To be familiar with the different materials and methods used for packaging

To understand the technology behind packaging

Module 1: Introduction to packaging. 5 hours

Packaging operation, package-functions and design.

Module 2: Principle in the development of protective packaging. 10 hours

Deteriorative changes in foodstuff and packaging methods for prevention, shelf life of packaged foodstuff, methods to extend shelf-life, accelerated shelf life studies

Module 3: Packaging containers (rigid and flexible) 10 hours

Corrosion of containers (Tin plate) -wooden boxes, crates, plywood and wire bound boxes

Corrugated and fibre board boxes, textile and paper sacks and their properties. Bags, pouches, wrappers, carton and other traditional package.

Module 4: Food packaging materials and their properties. 15 hours

LDPE, HDPE, PP, PET, polyester, nylon, acrylic and other

Module 5 Package and packaging testing 10 hours

Evaluation of packaging, material and package performance, packaging equipment, package standards and regulation.

Module 6 Special packaging 10 hours

Shrink packaging. Bar coding, aseptic and retortable pouches. Flexible and laminated pouches, aluminium as packaging material. Biodegradable packaging. Active packaging.

Reference books

1. Paine, F.A. and Paine, H.Y. A Handbook of Food Packaging. Leonard Hill, Glasgow, UK.1983
2. Saccharow, S. and Griffith, R.C. Food Packaging. AVI, Westport1970

Competency of the course:

- To know about the various types of food packages
- To know about the interactions between food and packaging materials
- To have a basic idea about the materials used for food packaging and their testing
- To know about the different forms in which a food can be packaged
- To know about the factors which have to be taken care of while designing a food package

Sanitation and Hygiene

Course codeVFP2S07TB

Classes/week 4

60 Hours

Objective

To know the principles and applications of sanitation in food industry

Module 1:Sanitation; Introduction 10 Hours

Definition and application to Food Industry and Food service. Microorganisms and sanitation. Source of food contamination. Prevention and control of contamination of food. Physical and chemical Disinfectants, Antiseptics, Bactericidal and Bacteriostatic agents used in food industry.

Module 2: Food Sanitizers 10 Hours

Sanitizers, chemical and physical properties of sanitizers, Mechanism of activity of most frequently used sanitizers. Cleaning compound, Chemical and physical characteristics of detergents. Sanitizing methods, handling precautions.

Module 3: Sanitation equipment's and systems in Food Industry 10 Hours

Mechanized sweepers and scrubbers, high pressure cleaners, CIP and COP equipments.
Membrane Cleaning .

Module 4: Quality of water used for food processing 10 Hours

Water quality standards. Waste products handling, Suspended solids, Total solids, BOD and COD requirements. Wastewater treatment and disposal

Module 5: Food handling and personal hygiene 10 Hours

Food handling and personal hygiene. Hygienic food handling. Hand washing. Food service control points. Regulatory requirements. Hygiene monitoring tests (HMT). Food contact surfaces. Biofilms. Environmental sanitation-premises, equipment, furniture and fixtures. Safety at work place.

Module 6: Insect and Pest Control 10 Hours

Pest control, insect, rodents, other pests. Sanitary Design and Construction for Food Processing., Sanitation programme and Quality assurance. Sanitation Regulation and Standards.

ReferenceBooks

1. Frazier, W.C. Food Microbiology. 4th edition. Mc Graw Hill. New York, 2008
2. Pelzar, H.J and Rober, D. Microbiology 5th edition Mc Graw Hill. New York. 2009
3. Prescott, L.M., Harley, J.P. and Klein, D.A. Microbiology. 4th edition Mc Graw-Hill, New York. 1999
4. Hola,J. Hygiene in food processing

Competency of the course:

To know about the various types of Sanitation techniques applicable in the food industry

To have a basic idea about their importance

Food Chemistry practical's

Course Code VFP208PB

Classes/week 3

60 Hours

Standardization of Fehling's solution

Estimation of Glucose by Lane and Eynons method

Estimation of Sucrose by Lane and Eynons method

Estimation of Aldose by Willstater's iodometric titration

Qualitative tests for proteins

Qualitative tests for carbohydrates

Estimation of starch

Estimation of crude fibre

Estimation of fat

Estimation of protein by Kjeldahls method.

Analysis of milk

Estimation of sulphur dioxide

Estimation of sodium benzoate

Estimation of vitamin C

Analysis of lipids- saponification value, acid value and iodine value.

Reference Books

1. Nielsen, S.S, Introduction to chemical analysis of foods. Jones and Barlett Publishers, Boston, London. 2003

2. Sadasivam, S.Manickam, A. Biochemical methods, 2nd edition, New Age International (P) Ltd, New Delhi 2003

Competency of the course:

To know about the estimation and qualitative tests of different food components

To have an idea as to how it is applied in the food industry.

To understand the principles behind each of these techniques.

To understand the sampling techniques

General Course

Critical thinking, Academic writing and presentation

(Adapted from existing M G University syllabus)

Course Code VFP2G04TB

Classes/week -4

60 Hours

Objectives

To make the students aware of fundamental concepts of critical reasoning and to enable them to read and respond critically, drawing conclusions, generalizing, differentiating fact from opinion and creating their own arguments.

To assist the students in developing appropriate and improving writing styles for various contexts.

To help students rectify structural imperfections and to edit what they have written.

To equip students for making academic presentations effectively and impressively.

Module 1 Critical Thinking

18 Hours

Introduction to critical thinking- Benefits- Barriers- Reasoning _ Arguments – Deductive and inductive arguments – Fallacies – Inferential comprehension-
Critical thinking in academic writing arguments- Fallacies- Inferential comprehension-
Critical thinking in academic writing- Clarity- Accuracy – Precision – Relevance

Module 2 Research for Academic Writing and the Writing Process

18 Hours

Data collection- Use of print, electronic sources and digital sources Selecting key points-Note making, paraphrasing, summary – Documentation- Plagiarism –Title- Body paragraphs- Introduction and conclusion- Revising – Proof-reading

Module 3 Accuracy in Academic Writing

18 Hours

Articles- Nouns and preposition- Subject- verb agreement- Phrasal verbs_ Modals- Tenses- Condition-als-Prefixes and suffixes- Prepositions _ Adverbs- Relative pronouns- Passives- Conjunctions Embedded question- Punctuation- Abbreviations

Module 4 Writing Models

18 Hours

Letters- Letters to the editor- Resume and covering letters- e-mail Seminar papers- Project reports- Notices- Filling applications forms, Minutes, agenda- Essays

Module 5 Presentation Skills

18 Hours

Soft skills for academic presentations- Effective communication skills- Structuring the presentation- Choosing appropriate medium- Flip charts- OHP- Power Point presentation- Clarity and brevity- Inter-action and persuasion- Interview skills- Group Discussions

Reference Books:

1. Marilyn Anderson, Pramod K Nayar and Madhuchandra Sen. Critical thinking, Academic Writing and Presentation Skills. Pearson Education and Mahatma Gandhi University.

Competency of the course:

To improve presentation and soft skills

To have a basic idea how to write academic documents

To be able to make a presentation on any given topic confidently

To be able to write official and unofficial letters in the proper format

Food Science and Nutrition II

60 Hours

Course code VFP205GB

Classes/week 4

Objectives

To Gain knowledge about the use of additives in the food industry

To gain knowledge about the latest laws relevant to the food industry

Module 1 – Fundamentals of Food Processing (Physical Principles)

8 hours

Steps involved in converting a raw harvested food materials to a preserved product with sound quality- harvesting, storage, manufacturing, preservation, packaging, distribution and marketing.

Module 2 Chemical principles in food processing

8 hours

Chemical changes in food that effect the texture, color, flavour, odor stability and nutritive quality during processing and storage.

Module 3: Minor Food Additives 1

6 hours

Aerating agents, Antistaling agents, bodying agents, clouding agents, curing agents, clarifiers,

Module 4: Minor Food Additives II

8 hours

Dietary supplements, dietary fibre, fat replacers, leavening agents, surfactants, tenderizers,

Module 5 :Minor Food Additives III 8 hours

Texturizers, thickeners, whipping agents, flour improvers, maturing agents, bleaching agents .

Module 6 Food Laws and regulations. 20 hours

PFA Act, Food safety and Standards Act 2006, Food Safety and Standards authority of India, AGMARK

Reference Books

1. Hui, Y H and Associates Editors, Handbook of Food Products Manufacturing Vol.I Wiley- Interscience, New Jersey 2007.
2. Hui, Y H and Associates Editors, Handbook of Food Products Manufacturing Vol.II , Wiley- Interscience, New Jersey 2007.
3. Potter, N.N., Hotchkiss, J.H. Food Science. Cbs Publishers, New Delhi 2000.
4. Srilaxmi, B. Food Science 3rd Edition, New Age International (P) limited Publishers. New Delhi, 2003
5. Guthrie, Hele, Andrews, Introductory Nutrition, 6th ed. St. Louis. Times Mirro Mosby Collage, 1988.
6. Mudambi S.R.. M.V. Rajoopal. Fundamentals of Foods and Nutrition (2nd ed.) Wiley easter Ltd., 1990.

Competency of the course:

To know about the various types of food additives and their applications in the food industry'

To have a basic idea about the physical and chemical principles of processing

To know about the various laws and regulations that apply to the food industry

To know the principle behind addition of the added additives.

The importance of their correct amount and problems which may be faced if the added quantity varies.

The methods of estimation and their application in real life situations

Business Studies

Course Code VFP2G06TB

Hours: 60

Classes/week 4

MODULE – 1 Role of business in economic development: Indian development experience, role of public and private sectors in the post-colonial period, experience of liberalization and globalization. Different stakeholders of business firm owners, managers, employees and others. Emergence of managerialism and the role of corporate governance; the goals of business, shareholder value maximization and its alternatives; goals for public sector, co-operatives and non-profit enterprises. Government regulation of business- objectives, methods and problems. 12hours

MODULE-2 Establishing business: entrepreneurship, legal, physical, financial, social, and psychological environments for entrepreneurs- Individual and group entrepreneurs, intrapreneurs . 5 hours

MODULE -3Mobilization of financial resources for business, Individual savings, Domestic savings in India, Factors affecting savings, Loans and advances, Sources of funds, Markets for raising money, Short term and long term funds- Lending institutions for business funds, Banks and non- banking financial institutions, Cost of capital, documenting, funding sources and areas of expenses- accounting and accounting practices, Return on investment- Factors of production and rewards to factors like payment of wages, rent, interest and profits- Payment to Government- Taxes, direct and indirect- State and national levels- Funds from the primary and secondary markets- 16hours

MODULE-4 Man power, organization & management strategies: Role of trained manpower for enhanced quality at individual, family, organizational and national level. Functioning of organization, The role of human resources, Management problems in small, medium and large organizations, Quality of life, Production of tangible and intangible products 10 hours

MODULE-5 Marketing and its role, Trends and Developments in Strategic Management, TQM, Bench Marking, Statistical Quality Control, Quality Circle, Business Process Re-engineering, Six Sigma, BPO, KPO. (Brief Study only) 8hours

MODULE-6 Consumer Protection Act, 1986: Rights of a consumer, Filing of appeals at the district level, state level and national level. Intellectual Property Rights, meaning, Patent rights, trademarks, Copyrights, Plagiarism. 9 hours

Competency of the course:

To know about the various consumer protection laws

To have a basic idea about mobilization of human and financial resources

To understand the legal, social , psychological factors that affect starting up a business venture

To understand the basics of finance and marketing

Semester 3

Core Course

Fish, meat and egg processing

Course Code VFP3S09TB

Classes/week 5

60 Hours

Objectives:

To learn about meat, fish and egg processing

Module 1: Meat Processing

10 hours

Basic meat science, chemical composition and structure of meat, post mortem changes in muscle and meat quality .inspection and grading of meat Classification. Meat preservation-chilling, freezing, curing, salting, pickling, smoking and canning. Abattoir practices. Slaughtering of animals and poultry, inspection and grading of meat. Meat quality evaluation. Mechanical deboning, meat tenderization. Aging, pickling and smoking of meat., By-product

Module 2:Egg processing

10 hours

Structure, composition, nutritive value and functional properties of eggs and its preservation by different methods. Factor affecting egg quality and measures of egg quality. By-products.

Module 3: Fish Processing

15 hours

Types of fish, composition, structure, post-mortem changes in fish. Handling of fresh water fish. Canning, smoking, freezing and dehydration of fish. Fish sausage.

Module 4: Sea food Processing

10 hours

Types of seafood, composition, structure, processing of prawn , squid.

Module 5: Poultry processing:

10 hours

Poultry composition, classification, slaughtering techniques, preservation of poultry meat, by products

Module 6: Test for assessment of raw meat

5 hours

TVN, FFA, PV, Nitrate and nitrite in cured meat

Reference books

- 1 Lawrie, R.A. Meat Science, 2nd Edn. Pergamon Press, Oxford UK.1975
- 2 Lavie A. Meat Handbook. 4th Edn. AVI, Westport.1980
- 3 Portsmouth, J.I. Commercial Rabbit Meat Production. 2nd Edn. Saiga Survey,England.1979
- 4 Stadelmen, W.J. and Cotterill, O.J., Egg. Science and Technology. 2nd Edn.1977
AVI, Westport.

Competency of the course:

To know about the various types of food products made of meat

To have a basic idea about their processing , packaging and quality control

To understand the post mortem changes in meat and the effect it has on its quality

To know about the hygienic slaughtering techniques and its effect on meat quality

Food Fermentation

Course codeVFP3S10TB

Classes/week 5	60 hours
Module 1: Introduction to fermentation	10 hours
Introduction to fermentation, rate of microbial growth and death, fermentation kinetics	
Module 2: Beneficial effects of microorganisms	10 hours
Production of vitamins, amino acids, organic acids, enzymes, antibiotics	
Module 3: Microorganisms of industrial importance	12 hours
Biomass, fermentation and effluent treatment	
Module 4: Fermented foods from cereal	8 hours
Idli-dosa, Dhokla and other fermented foods	
Module 5: Fermented foods from fruits and vegetables	8hours
sauerkraut, soy sauce and other foods	
Module 6: Fermented foods from milk	12 hours

cheese and other fermented foods

Reference Books

1. Manay, N.S, Shandaksharaswamy, M., Foods- Facts and Principles, New Age International Publishers, New Delhi, 2004
2. Potter, N.N, Hotchkiss, J.H. Food Science. CBS Publishers, New Delhi. 2000
3. Srilakshmi, B. Food Science (3rd Edition), New Age International (p) Limited Publishers, New Delhi, 2003.
4. Frazier, W.C. Food Microbiology. 4th edition. Mc Graw Hill. New York, 2008
5. Pelzar, H.J and Robert, D. Microbiology 5th edition Mc Graw Hill. New York. 2009

Competency of the course:

To know about the various types of food products made by fermentation their manufacture and nutritive value'

To have a basic idea about their processing

Spice Processing

Course codeVFP3P11TB

Classes/week 5	60 Hours
Module 1: Pepper	10 hours
Black pepper, green pepper, white pepper, oleoresin and volatiles.	
Module 2: Other major spices	10 hours
Cardamom, ginger, chillies, turmeric; powder, oleoresin and volatiles.	
Module 3: Minor spices	10 hours
Ajwan, coriander, cumin, cinnamon, fenugreek, garlic, mustard, mace and nutmeg, onion, saffron, tamarind, cloves, mint, vanilla and asafoetida	
Module 4: Challenges in spice processing	10 hours
Aflatoxins, Ochratoxins and other fungal contaminations.	
Module 5:Spice Mixes	10 Hours
Module 6: Extraction of flavour	10 Hours

Reference Books:

- 1 Kader, A. A.. Postharvest Technology of Horticultural Crops, 2nd Ed. University of California, Division of Agriculture and National Resources, California.1992
- 2 Salunkhe, D.K. and Kadam, S.S. Ed. Handbook of Vegetable Science and Technology. Marcel Dekker, New York, USA.1998
- 3 Wills, R.B.H., McGlasson, W.B., graham, D., Lee, T.H. and Hall, E.G.. Postharvest: An Introduction to the Physiology and Handling of Fruits and Vegetables. BSP Professional Books, Oxford 1989

Competency of the course:

To know about the various types of spices and oleoresins which can be used in the food industry and their applications'

To have a basic idea about spice processing

Food Microbiology

Course Code VFP3G07TB

Classes/week 4 **60 Hours**

Objectives

To acquire an elementary knowledge of micro-organisms

Module 1: Introduction to microbiology **5 hours**

Introduction to microbiology and its relevance to everyday life. History of microbiology of food.

Module 2: General morphology of micro-organisms **10 hours**

General characteristics of bacteria, fungi, virus, protozoa and algae

Module 3: Microbial growth **10 hours**

Microbial growth pattern, physical and chemical factors influencing destruction of micro-organisms.

Module 4 :Microbiology of different foods :spoilage and contamination **20hours**

Sources, types, effects on the following Cereals and cereal products, sugar and sugar products, vegetable and fruits, meat and meat products, fish and other sea foods, egg and poultry, milk and milk products, canned foods.

Module 5: Environmental microbiology 5 hours

Water, air, soil and sewage

Module 6: Microbial intoxications and infections 10 hours

Sources of contamination of foods, toxin production and physiological action. Sources of infection of food by pathogenic organisms food poisoning and food intoxications.

Reference books

1. Microbiology Branen A.L. and Davidson, P.M. 1983. Antimicrobials in Foods. Marcel Dekker, Newyork.
2. Jay J.M. .Modern Food Microbiology. 3rd Edn. VNR, New York.1986
3. Robinson, R.K. Ed. 1983. Dairy Microbiology. Applied Science, London. 1983
4. Frazier, W.C. Food Microbiology. 4th edition. Mc Graw Hill. New York, 2008
5. Pelzar, H.J and Robert, D. Microbiology 5th edition Mc Graw Hill. New York. 2009

Competency of the course:

To know about the various types of microorganisms that can cause food spoilage

To have a basic idea about they spoil foods and ways and means to prevent it

The diseases and infections which they can cause and how to prevent it

To understand about the application of the equipment's present in the lab

To be able to use a microscope independently

Microbiology Practical's

Course codeVFP3G08PB

Classes/week7

60hours

Study of compound microscope.

Working and handling of common microbiological laboratory equipments and materials.

Preparation of microscopic examination.

Monochrome staining.

Differential staining.

Capsule staining.

Spore staining.

Microscopic examination of living organisms- Hanging Drop Mount method for the demonstration of bacterial motility.

Negative staining of bacteria.

Composition ,preparation and sterilization of media nutrient agar, potato dextrose agar, Mc Conkey agar, EMB agar.

Isolation, enumeration and characteristics of microorganisms.

Microbiology of air and surface isolation of microorganism from air by settle plate method

Competency of the course:

To know about the various types of microbiological procedures practised in the food industry

To have a basic idea about their applications in the food industry

To be able to independently handle all equipment's present in the lab

To know how to use an autoclave and laminar flow

To understand the importance of sterility and cleanliness in a food processing area

MARKETING MANAGEMENT

Course Code VFP3G09TB

Classes /week4

Hours: 60

MODULE-1 Marketing management - Introduction- Definition of marketing and marketing management- Marketing concepts and functions-Marketing mix. 10 hours

MODULE-2 Market segmentation-Concept-Need- Basis-Market targeting-Market Positioning -Understanding consumer behaviour- Buying motives- Factors influencing consumer buying decisions 12 hours

MODULE -3 Marketing of products- product- Meaning- Product development- Product mix- PLC- Branding- brand equity- Brand loyalty-Trade mark 8 hours

MODULE -4Packaging and labelling- Pricing of products-Factors influencing pricing-

Pricing policies and Strategies-Types of pricing. 10 hours

MODULE-5 Logistic and supply chain management-Its elements-Channel of distribution types- Factors affecting the choice of a channel of distribution. 10hours

MODULE-6 Emerging trends in marketing-Modern marketing-Direct marketing- E Marketing- Tele marketing-Viral marketing-Relationship marketing-Social marketing- DE marketing-Remarketing- Synchro marketing-Service marketing. 10 hours

Course Competency

To know about the various types marketing strategy involved in generating sales for a new product food products'

To have a basic idea about different marketing skills,

the different ways in which a food can be marketed to give optimum visibility,

the importance of packaging in improving sales and the latest marketing trends

Semester 4

Core course

Cereals, Pulses and Oilseed technology

Course code VFP4S12TB

Classes per week 5 60 hours

Objectives

To give a general outline about the principles, structure and composition and storage of different cereals, pulses, oilseeds and their products.

Module 1: Wheat Processing: 10 hours

Wheat types, milling of wheat, quality of flour and flour treatment, dough chemistry and rheology, technology, durum wheat and pasta products.

Module 2: Rice Processing 10 hours

Rice milling, milling machine, effect of different factors on milling yield and rice quality, parboiling of rice, effect of aging of rice, rice products-enrichment with vitamin and minerals, byproduct utilization.

Module 3: Processing of barley corn and oats 4 hours

Chemical constituents, processing, pearling and malting of barley, Oats, Corn-wetland dry milling, corn flakes, starch, its derivatives syrup, germ oil, preparation of extruded products.

Module 4: Processing of legumes 4 hours

Dhal milling and processing of pulses, fermented and traditional products.

Module 5: Oil Extraction, Basic processing of fats and oils 20 hours

Conditioning and oil extraction, importance of oil seeds processing in India,

Expeller pressing and solvent extraction of oil, oil refining, Commercial oil resources.

Refining of oil, rendering and winterization, degumming, refining, bleaching, hydrogenation, fractional crystallization, interesterification, glycerolysis, molecular distillation, plasticizing and tempering.

Module 6: By-products 12 hours

Shortening - introduction, manufacturing and uses of shortening, types of shortening.

Margarine-manufacturing and uses of shortening, Mayonnaise and salad dressings.. imitation dairy products - peanut butter and vegetable ghee. Packing and storage of fats and oils, fat substitutes.

Reference Books

1. Chakraverty, A.. Postharvest Technology of Cereals, Pulses and oilseeds. Oxford and IBH, New Delhi.1988
2. Durbey, S.C.. Basic Baking: Science and Craft. Gujarat Agricultural University, Anand (Gujrat).1979
3. Kent, N.L..Technology of Cereals. 3rd Edn. Pergamon Press, Oxford, UK.1983
4. Mathews, R.H. Ed.. Legumes: Chemistry, Technology and Human Nutrition. Marcel Dekker, New York.1989
5. Pomeranz, Y.. Modern Cereal Science and Technology. VCH Pub., New York.1987
6. Salunkhe, D.K., Kadam, S.S. and Austin A. Ed.. Quality of Wheat and Wheat Products. Metropolitan Book Co., New Delhi.1986
7. Salunkhe, D.K., Kadam, S.S. Ed. Handbook of World Food Legumes: Chemistry,Processing and Utilization, (3 vol. set). CRC Press, Florida.1987
8. Hamilton, R.J. and Bharti, A. Ed. . Fats and Oils: Chemistry and Technology.Applied Science, London.1980

Competency of the course:

To know about the various types of food products' made out of cereal grains. Pulses and oil seeds

To be able to make small products at the home scale

To have a basic idea about their processing, sensory evaluation and quality control

Technology of beverages

Course code VFP4S13TB

Classes/week5 **60 hours**

Objectives:

To study about the various beverages, their processing and products made out of them.

Module 1: Introduction and classification of beverages **5 hours**

Introduction to the study of beverages

Module 2: Mineral water **10 hours**

water source and deionization of mineral water, water treatment process: Filtration, Adsorption, ion exchange, reverse osmosis, chemical oxidation, biological process, remineralisation and microbiological treatment. Water testing, hardness, deionization, reverse osmosis, distillation.

Module 3: Processing of tea: **10 hours**

Chemical composition and processing of tea and coffee and their quality assessment. Types of tea: black tea, green tea, oolong tea.

Module 4: Types of coffee: **10 hours**

Vacuum coffee, drip coffee, iced coffee. Espresso coffee, instant coffee. Decaffeination of coffee types of decaffeination: Roselius method, Swiss water process, direct and indirect method, triglyceride method, carbon dioxide method.

Module 5: Carbonated beverages **10 hours**

Carbonated soft drinks- Ingredients and preservatives used in carbonation, syrup room operations and equipment's involved.

Module 6: Alcoholic Beverages **15 hours**

Beer Making and Types of Beer: ale, lager, pilsner, stout and porter beer. Wine making and Types of wine: white wine, red wine, dry wine, sweet wine, and sparkling wine. Whisky

manufacture and types of whisky: Scotch whisky, malt whisky, Irish whisky and Canadian whisky, Manufacture of rum, vodka, brandy and gin.

Reference Books

1. Manay, N.S, Shandaksharaswamy, M., Foods- Facts and Principles, New Age International Publishers, New Delhi, 2004
2. Potter, N.N, Hotchkiss, J.H. Food Science. CBS Publishers, New Delhi. 2000
3. Srilakshmi, B. Food Science (3rd Edition), New Age International (p) Limited Publishers, New Delhi, 2003.
4. Nicholas Dege. Technology of Bottled water. Blackwell publishing Ltd, UK.,2011
5. Varnam A.H and Sutherland P.J Beverages: Technology, Chemistry and Microbiology, Aspen Publication, 1999

Competency of the course:

To know about the various types of food beverages that are made

To have a basic idea about the difference between the various beverages seen in the market and their nutritional value

To know about the nutrient content, additives added to them and chances of spoilage

To be able to know the different types of tea and coffee available in the market and the difference between them

Unit operations in the food industry

Course code VFP4S14TB

Classes/week 5

60 Hours

Objectives

Students will be able to apply material balance and energy balances to the field of food engineering.

Students will be able to understand equipment's used in the food industry.

To discuss the various processing equipment's on the basis of unit operations of mechanical processes.

Module 1- Heat Transfer in Food Processing

10 hours

Modes of heat transfer- conductive heat transfer, convective heat transfer, , radiation heat transfer System for heating and cooling food products, plate heat exchanger, tubular heat exchanger, scraped surface heat exchanger, steam infusion heat exchanger.

Module 2- Mechanical Operations 10 Hours

Mixing- different type of mixers used in food in industry, Clarification and concentration process-evaporation, diffusion, concentration. Sedimentation, centrifugation, distillation, Filtration- batch filtration, continuous filtration, ultra filtration, reverse osmosis

Module 3- Design and selection of food processing equipment 10 Hours

Materials of construction-metals, steel, stainless steels, aluminium, copper, plastic, and glass, Fabrication of equipment-strength of construction, Fabrication and installation of equipment, hygienic design of food processing equipment

Module 4- Mechanical processing equipment 10 Hours

Size reduction- cutting, crushing and grinding, size enlargement-agglomeration, homogenization-pressure homogenization, colloid mills, ultrasonic homogenizers, forming extrusion and forming equipment

Module 5- Refrigeration and Freezing Equipment 10 Hours

Refrigeration-refrigeration cycle, compressors, evaporators, condensers, cooling equipment, hydrocooling ,vacuum cooling, surface contact cooling, tunnel cooling, vacuum cooling freezing-air freezing, cold surface freezing, liquid freezing

Module6- Food Dehydration Equipment 10 Hours

Principles of drying, commercial food drying equipment-sun dryers, solar dryers, bin, silo and tower dryers, tray/cabinet dryers, rotary driers, drum dryers, spray dryers, vacuum and freeze dryers

Reference Books:

1. Dincer, I. Heat Transfer Food Cooling Application. Taylor and Francis Publishers, USA.1997.
2. Heldman, D.R. and Lund, D.B Handbook of Food Engineering 2nd edition. CRC press, Newyork. 2007.
3. Singh, R.P Introduction to Food Engineering 3rd edition. Academic Press, London. 2004.
4. Saravacos, G D and Kostarapoulas A E. Handbook of Food Processing Equipment.2006. Bribasis Art Press Ltd, New Delhi.

Competency of the course:

To know about the various types of equipment's used in the industrial production of foods

To have a basic idea about their design and engineering

Cleaning, repair and maintenance of these equipment's

General Courses

Microbiology practical's II

Course code VFP4G10PB

60 Hours

Classes per week 7

Microbiology of milk.

- a) Quantitative analysis of milk by standard plate count (SPC) method.
- b) Enzymatic test of milk by Methylene Blue Reductase Test (MBRT).
- c) Quality testing of milk by Resazurin test.
- d) Determination of phosphatase activity of milk.
- e) Detection of mastitis through milk test.
- f) Detection of calcium and phosphorus in milk.

Microbiological analyses of food products.

- a) Meat
- b) Fish
- c) Sauce.

Microbiology of water

- a) Presumptive test for coliform group of bacteria or determination of most probable number.
- b) Confirmed test for coliform bacteria.
- c) Completed test for coliform bacteria

Biochemical testing.

- a) Triple sugar iron agar test
- b) Indole production test

- c) Methyl red test
- d) Voges Proskauer test
- e) Citrate utilization test.

Competency of the course:

To know about the various types of media used and microorganisms commonly seen in foods and their detection

To know about the various types of microbiological procedures practised in the food industry

To have a basic idea about their applications in the food industry

To be able to independently handle all equipment's present in the lab

To know how to use an autoclave and laminar flow

To understand the importance of sterility and cleanliness in a food processing area

Environmental Studies and waste Management

Course code VFP4G11TB

Classes/week 4

60 hours

Objectives

To understand the importance of protection of the environment

To study the various methods involved in solid and liquid waste disposal

Module 1: Definition of environmental studies

10 hours

Environmental science, Environmental issues, Environment management.

Module 2: Sustainable development

10 hours

Principles of sustainable development, Sustainability Avoidance and reduction methods
International waste movement

Module 3: Waste water treatment

10 hours

Disposal or reuse, Processes used Sedimentation Oxidation, Biochemical oxidation
Chemical oxidation, Polishing ,Wastewater treatment plants Sewage treatment
plants Tertiary treatment Industrial wastewater treatment plants

Module 4: Solid waste disposal

10 hours

Central principles of waste management, Waste hierarchy, Life-cycle of a Product, Resource efficiency, Polluter pays principle, Waste handling and transport, Waste handling practices

Module 5: Disposal solutions 10 hours

Landfill, Incineration, Recycling, Re-use, Biological reprocessing, Energy recovery Pyrolysis Resource recovery

Module 6 By Product utilization 10 hours

By products from fruit and vegetable processing, pectin, flavour extracts, By products from meat industry, gelatine, meal, by products from the milk industry, whey proteins.

Reference Books

1 Prabir Basu : Biomass Gasification, Pyrolysis and Torrefaction : Practical Design and Theory

2 Hammer, Mark J.. Water and Waste-Water Technology. New York: John Wiley & Sons. 1975

3 Kemmer, Frank N. The Nalco Water Handbook. New York: McGraw-Hill Book Company.1979

4 Patterson, James W. Wastewater Treatment Technology. Ann Arbor, Michigan: Ann Arbor Science.1980

Competency of the course:

To know about the various types of by products made from the waste of the food industry

To have a basic idea about their utilization and disposal

PRODUCT AND BRAND MANAGEMENT

Course Code VFP 4G12TB

Classes/week 4

60 Hours

MODULE-1 Product management: introduction and importance- role of product manager product plan and its components-product line-additions, alterations and its deletions.10 hours

MODULE-2 Product positioning-kinds-organizing the product teams-product policy-new product demand forecasting models-product portfolio model-perceptual mapping. 10 hours

MODULE-3 New product development- stages-new product launch-strategies-mistakes success and failures. 10 hours

MODULE-4 Brand management- strategic issues in brand management-concepts principles-brand extension-brand stretching-brand equity and its components- its measurement 10hours

MODULE-5 Co-branding- brand positioning- product management audit-multi branding- Re-branding-packaging methods and strategies 12hours

MODULE-6 Right to information Act: Right to access information on specific issues banking Transaction, Insurance transaction, government dealings and related services. (8hours)

Competency of the course:

To know about the various factors to be kept in mind while managing a new product

To know about the various types marketing strategy involved in generating sales for a new product

To have a basic idea about different marketing skills, the different ways in which a food can be marketed to give optimum visibility, the importance of packaging in improving sales and the latest market trends

SEMESTER 5

Food Quality Assurance

Course codeVFP5S15TB

Classes/week 5

60 Hours

Objectives:

To provide a basic understanding of quality concepts and practice in food companies.

To provide approaches to the planning and organization of a quality control system.

To provide a basic acquaintance with standards and specifications.

Module 1 Quality Control concepts as applied for food industry 8 hours

General concepts of quality and quality control .Major quality control functions

Module 2 Standard tests for quality assessment. 12 hours

Standard tests for quality assessment, Microanalytical tests, Microbiological tests

Histological tests, Standard test methods

Module 3 Quality control in food industry. 8 hours

methods of evaluation and control of the various aspects of quality of raw materials

manufacturing process and testing of finished products.

Module 4 Quality Assurance and total Quality Control. 12hours

Nature of TQC, Approaches to TQC, Role of Management

Module 5 Quality Improvement Techniques. 6hours

Quality improvement plans (QIP),Quality control circles (QCC) ISO HACCP

Module 6 External Quality Control Activities. 16 hours

Inspection Pre shipment inspection and inspection at port of destination and inspection at port of destination, Certification and quality marks, Standardization and national standards bodies,Testing laboratories

Reference Books

Philip,A.C. Reconceptualizing quality. New Age International Publishers,Banglore. 2001.

Bhatia,R. and Ichhpujan,R.L. Quality assurance in Microbiology. CBS Publishers and Distributors, New Delhi.2000

Kher, C.P. Quality control for the food industry. ITC Publishers, Geneva. 2000.

Competencies of the course

To understand the importance of safety standards and quality control in the food industry

Fruit and vegetable processing: 60 Hours

Course Code VFP5S16TB

Classes/week 6

Module 1:Introduction to fruit and vegetable preservation 10 hours

Principles and methods of fruit and vegetable preservation. Composition and related quality factors for processing

Module 2: Principles of storage of fruits and vegetables. 10 hours

Types of storage: natural, ventilated low temperature storage, DA and MA storages.

Module 3: Canning of fruits and vegetables 10 hours

Tin cans, glass containers, seaming technology, aseptic canning technology.

Module 4 : Preservation by addition of sugar and salt 10 hours

Fruit and vegetable juices, preparation of syrups, cordials and nectars, juice concentrates, pectin and related compounds, jams, jellies, marmalades, preserves. Theory of gel formation Pickles, chutneys and vinegar production, tomato products.

Module 5: Preservation by drying and dehydration 10 hours

Drying and dehydration of fruits and vegetables, problems related to storage of dehydrated products.

Module 6: Preservation by freezing 10 hours

Freezing and freeze-drying of food and frozen products.

Reference books

1 Bose, T.K. Ed. . Fruits of India: Tropical and Sub-tropical. Naya Prokash, Calcutta.1985

2 Dauthy, M.E. . Fruit and Vegetable Processing. International Book Distributing Co. Lucknow, India.1997

3 Hamson, L.P. . Commercial Processing of Vegetables. Noyes Data Corporation, New Jersey.1975

4 Kadar, A. A. . Postharvest Technology of Horticultural Crops. 2nd Ed. University of California.1992

5 Lai, G., Siddappa, G. and Tondon G.L. . Preservation of Fruits and Vegetables, Indian Council of Agril. Research, New Delhi.1986

6 Salunkhe, D.K. and Kadam, S.S. Ed. Handbook of Fruit Science and Technology: Production, Composition and Processing. Marcel Dekker, New York1995.

7 Salunkhe, D.K. and Kadam, S.S. Ed. Handbook of Vegetable Science and Technology. Production, Composition, Storage and processing Marcel Dekker, NewYork.1995

8 Srivastava, R.P. and Kumar, S. . Fruit and Vegetable Preservation: Principles and Practices. 2nd Ed. International Book Distributing Co. Lucknow.1998

9 Ting, S.V. and Rousett, R.L. . Citrus Fruits and Their Products. Marcel Dekker, New York.1986

10 Thurme S. Ed. . Food Irradiation. Elsevier Applied Science, London.1991

11 Postharvest: An Introduction to the Physiology and Handling of Fruits and Vegetables. Granada, U.K.

Competency of the course:

To know about the various types of food products' made out of fruits and vegetables

To have a basic idea about their processing , sensory and quality evaluation

To be able to independently make a few products.

To be able to start a small home scale food processing unit

Food Toxicology

Course codeVFP5S17TB

Classes/week 4

60 Hours

Objectives

To make the students aware of the toxins in food

To assess the safety of food and to know the techniques used in food safety evaluation

Module 1 –Importance of toxicology 10 hours

Scope, history and development of toxicology, principles of food toxicology, classifications and divisions in toxicology, classes of toxicants, indicators of toxicity and their evaluation, understanding about safe food and nutrition, further developments in toxicology

Module 2- Naturally occurring toxins in food 10 hours

Plant and animal toxins, natural toxicants present in foods(plant, animal, marine and microbial toxins), phytoalexins, alkaloids, inhibitors of enzyme and toxic proteins, cyanogenic glycosides, phenols, antagonists of vitamins, Xenobiotics, natural carcinogens in animal and plant material and their effects on living organisms.

Module 3-Microbial toxins 15 hours

Food borne disease agents among the major microbial groups of fungi, bacteria, algae, virus, protozoa and worms. Bacteriotoxins (botulin and other bacterial exotoxins) Mycotoxins (Aflatoxins, trichothecenes, ochratoxins and fumonisins) their production, properties and parameters effecting their growth in foods

Module 4- Environmental toxicants 10 hours

Health effects of nitrate, nitrite and nitroso compounds, pesticides, heavy metals and other toxic

metals (lead, arsenic , cadmium and mercury) radionuclides,

Module 5-Organic environmental contaminants of industry 10 hours

polycyclic aromatic hydrocarbons, diphenyls, dioxins and pentachloro phenols

Module 6- Toxicants formed in processed foods 10 hours

Hazardous chemical compounds arising from processing and storage of foods, heating and chemical changes in oils during frying, nitrosoamines and other biologically active nitro compounds, polycyclic aromatic hydrocarbons

Reference Books

1 Schlegel H., 1988: General microbiology- Cambridge, New York New Rochelle, Melbourne, Sydney: Cambridge University Press.

2 Chelkowski J. (ed): Cereal grain. Mycotoxins, Fungi in drying and storage- Elsevier, Amsterdam.

Competency of the course:

To know about the various types of toxins present in foods'

To have a basic idea about their harmful effects and the ways to prevent them from contaminating foods

Food Processing Practicals

Course codeVFP5P15TB

Classes/week 3 **60 hours**

Preparation of paneer, khoa, ghee, butter, buttermilk

Preparation of icecream

Preparation of mayonnaise, peanut butter

Preparation of sauce, ketchup and other tomato products

Preparation of jam, jellies, pickles, chutneys

Business Communications

Course CodeVFP5G15TB

classes/week 4 **60 Hours**

MODULE-1 Communication-Need-Process-Types-Oral-written-Verbal-Nonverbal-Internal,External- Non-verbal communication-Body language-Kinesics, Proxemics-Para language Channels-Barriers-Principles of effective communication 10 hours

MODULE -2 Presentation Skills –How to make a power point presentations- Principles of effective presentations – Listening Skills - Importance of Listening skills .10 hours

MODULE-3 Job application letters-Resume-CV-Reference and recommendation letters-Employment letters-Online application-Soft skill 5 hours

MODULE-4 Business letters-Parts and layout of business letters-Business enquiry letters offers and quotation- Orders and execution-grievances and redressals. Sales letters-Follow-up letters-Circular letters-Status enquiry-Collection letters-Preparation of partnership deed power of attorney 20 hours

Module 5 Practical work: Written communication, Power point presentations and listening exercises can be practiced as a part of learning process. 15 hours

Semester 6

Core Subjects

Food analysis and adulteration testing

Course code VFP56S19TB

Classes /week4

60 Hours

Objectives

To understand different sampling techniques employed in chemical analysis of foods.

To learn various chemical methods of food analysis.

To be familiar with adulteration test used for quality control

Module 1-Introduction to food analysis 10 hours

Proximate principles and analysis of food, official methods of analysis.

Module 2-General physical methods of analysis of foods 5 hours

Lactometry determination, refractometry, polarimetry and polarography, food rheology, viscosity,surface tension, freezing point

Module 3-Sampling techniques 10 hours

Population and sampling, importance of sampling, types of sampling, sampling plan, preparation of samples, problems in sampling.

Module 4-Chemical analysis of moisture, carbohydrates and protein 10 hours

Moisture assay-oven drying methods, Karl Fischer titration, Carbohydrate-starch, crude fibre Protein-Kjeldhal method, Biuret method, Lowry's method.

Module 5-Chemical analysis of fat, vitamin C and minerals 10 hours

Fat-soxhlet method, gerber method. Analysis of vitamin C. Estimation of minerals by ashing-dry, wet and low temperature plasma ashing.

Module 6-Food adulteration and quality Criteria 15 hours

Definition, classification-intentional & incidental, health hazards caused by various adulterants and the critical level of metals in various foods, common adulterants in food and their testing.

Milk and milk products, oil and fats, spices and condiments, food grains, flours, canned foods, fruit and vegetable products, flesh food, sugar and preserves, alcoholic and non-alcoholic beverages.

Reference books:

- 1 Kalia, M. Food Analysis and Quality Control. Kalyani Publishers, New Delhi. 2002.
- 2 Winton, A. L. and Winton, K. B. Techniques of food analysis. Allied Scientific Publishers, New Delhi. 1999.
- 3 Nielsen, S. S. Introduction to the chemical analysis of foods. Jones and Barlett Publishers, Boston, London. 2003.
- 4Connell, J. J. Control of fish quality. Blackwell Scientific Publications, Cambridge. 2000.
- 5 PFA ACT.

Competency of the course:

To know about the various types of food products' and their analysis as per prescribed standard procedures .

To test for the presence of adulterants in common foods

Food Analysis and Adulteration Practical's

Course code VFP5S20PB

Classes/week 6

60 hours

Introduction to laboratory equipment and apparatus

Introduction to investigative techniques- qualitative and quantitative analysis

Analysis of squash

Analysis of milk

Analysis of condensed milk

Analysis of jam

Analysis of vinegar

Analysis of honey

As per fissai specification as per their manual

Competency of the course:

To know about the various types of food products and analysis of their constituents

To have a basic idea about the reasons for their variations if any

Sensory Evaluation of foods

Course Code VFP6G16TB

Classes/week 4 60 Hours

Objectives

To understand different aspects of sensory science and its application

Module 1- Introduction 10 Hours

Sensory evaluation: Definition and Importance of sensory evaluation; Practical requirements for conducting sensory tests, limitations of sensory evaluation.

Module 2- Testing conditions 10 Hours

General Testing conditions- Testing area, testing set up, lighting, testing schedule, Preparation of samples, sample condng, evaluation card preparation.

Module 3- Sensory assessment of taste, odour, smell and texture 10 Hours

Taste __ Taste sensation on the tongue, Recognition test for the four basis tastes, Water quality for sample preparations, Standard compounds used for preparing basis tastes, Taste modifiers, Preception of sweet taste. Odour and Smell- Anatomy of nose, Smelling techniques, Vonskramlk, Test, Theories of olfaction Texture__ Definition, Classification of textural

characteristics, glossary of textural terms, Definition for mechanical properties, Texture measurement

Module 4- Sensory assessment of colour and flavour in foods 10 Hours

Colour of foods. Flavour and – aroma perception, Definition of flavour, Flavour profile methods, Flavour compounds Temperature sensation, touch sensation, kinaesthetic sensations, and sound sensations.

Module 5 – Sensory Tests 10 Hours

Threshold test, sensitivity test Application of sensory analysis in food industry, trained panel members.

Module 6- Data analysis 10 Hours

Importance of data analysis, tests of significance, null hypothesis, mean, median, variance, standard deviation, t-test, chi-square test.

Reference books:

1. Jellinek,G., Sensory Evaluation of Food-Theory and Practice. Elis Horwood Ltd., England, 1985.
2. Lawless H.T, Sensory Evaluation of food, Food Science Text series, Springer Science, 2010
3. Srilakshmi,B., Food science., New Age International (p) Limited., New Delhi, 2005

Competency of the course:

To know about the various types of sensory evaluation tests and their applications in the food industry

To know the sensory attributes of different foods and changes due to processing

General Paper

Analytical instrumentation

Course code VFP6SG17 TB

Classes/week 4

60 Hours

Objectives:

To know the principles and applications of different techniques used in food and nutrition research.

To gain knowledge about different instruments used in food analysis.

Module 1-Chromatography

15 hours

Introduction, principles of chromatography; Techniques and working principle and application in food industries of-Paper chromatography, GC, GLC, HPLC, TLC.

Module 2-Spectroscopy 15 hours

Principles of spectroscopy, properties; Techniques and working of-Infrared spectroscopy, UV spectrophotometer, Atomic absorption, Atomic emission, Fluorimetry and NMR.

Module 3-Radiotracer Techniques 10 hours

Introduction, Nature of radioactivity, units, radioactive counters, solid, gas and liquid scintillation.

Module 4-Electrophoresis 10 hours

Definition, types of electrophoresis methods, free solution electrophoresis, paper or gel electrophoresis, SDS-PAGE.

Module 5-Measurement of enzyme activity and Fluorimetry 20 hours

Enzyme activity, basic principles, chemical reactions, catalytic effects, reaction rates, reaction mixtures. Thiamin, Riboflavin

Reference books:

- 1.Mahindru, S/N. Food additives. Characteristics, detection and estimation. Tata McGraw-Hill Publishing Company Limited, New Delhi. 2000.
- 2.Nielsen, S.S. Introduction to the chemical analysis of foods. Jones and Barlett Publishers, Boston, London. 2004.
- 3.Pearson, D. The Chemical Analysis of Foods, Churchill Livingstone, New York, 2002.
- 4.Sharma, B. K. Instrumental Methods of Chemical Analysis. Goel Publishing House, New Delhi, 2004.
- 5.Srilakshmi, B., Food Science., New Age International (P)Limited., New Delhi, 2005.

Competency of the course:

To know about the various types of instrumental analysis applicable to the food industry

Analytical Instrumentation practical

Course code VFP6SG17 TB

Classes/week 4 **60 Hours**

Estimation of Iron by colorimeter

Estimation of Phosphorous by colorimeter

Estimation of total carotene by spectrophotometer

Estimation of sodium by flame photometry

Estimation of potassium by flame photometry

Estimation of calcium by macro method

Competency of the course:

To know about the various types of food product. their nutrient content and methods of determining them '

To have a basic idea about the tests that are done in the lab on these products