



UNIVERSITY OF CALICUT

Abstract

General and Academic - B.Voc Food Technology (Food Processing & Safety Management) under modified B.Voc Regulations 2021 - Scheme and Syllabus - Approved - Implemented w.e.f 2021 Admissions - Orders issued.

G & A - I - F

U.O.No. 19324/2022/Admn

Dated, Calicut University.P.O, 12.10.2022

- Read:-*1. U.O. No. 7135/2021/Admn dated 19.07.2021
2. Minutes of the Board of Studies in Food Technology held on 22.03.2022
3. Remarks of the Dean, Faculty of Science 25.04.2022
4. Orders of the Vice Chancellor in the file no.120153/GA-IVJ1/2018/Admn Dated 26.04.2022.

ORDER

1. The Regulations for B.Voc Programmes were implemented, vide paper read (1) above.
2. Accordingly, the Board of Studies in Food Technology approved the syllabus B.Voc. Food Technology (Food Processing & Safety Management) in accordance with the Regulations for B.Voc Programmes-2021 of University of Calicut w.e.f 2021 admissions vide paper read (2) above.
3. The Dean Faculty of Science and Vice Chancellor has approved the scheme and syllabus of B.Voc. Food Technology (Food Processing & Safety Management) in accordance with the Regulations for B.Voc Programmes-2021 of University of Calicut w.e.f 2021 admissions, subject to ratification by the Academic Council vide paper read (3) & (4) above,
4. Sanction is therefore accorded for implementing the scheme and syllabus of B.Voc Food Technology (Food Processing and safety management) in accordance with the Regulations for B.Voc Programmes-2021 under University of Calicut w.e.f 2021 admissions, subject to ratification by the Academic Council .
5. Orders are issued accordingly. (Scheme and Syllabus appended)

Abdussamad M

Assistant Registrar

To

Principals of the Colleges offering B.Voc Food Technology (Food Processing & Safety Management)

Copy to: PS TO VC/PA to R/PA TO CE/JCE VII/JCE 1/EX-I,II,IV/Library/SF/DF/FC

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Section Officer

UNIVERSITY OF CALICUT



SYLLABUS

B.Voc. Food Technology (Food Processing & Safety Management)

PROGRAMME

**CHOICE BASED CREDIT AND SEMESTER
SYSTEM FOR VOCATIONAL UNDER
GRADUATE (B.VOC) CURRICULUM – 2021**

(CBCSS VUG 2021)

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Preamble

Syllabus & scheme of B.voc. Food Technology (Food Processing & Safety Management) for the academic year 2021-22 according to University of Calicut Regulation of CHOICE BASED CREDIT AND SEMESTER SYSTEM FOR VOCATIONAL UNDER GRADUATE (B.VOC) CURRICULUM - 2021 (CBCSS VUG 2021).It is also prepared based on outcome based education. we acknowledged those who helped to shape up this revised syllabus.

About the Programme

This programme is structured according to the “Regulations for Choice Based Credit Semester System for Vocational Under Graduate Curriculum 2021” (CBCSS VUG 2021) of University of Calicut

1. Title of the programme

B.voc. Food Technology (Food Processing & Safety Management) programme refers to the entire course of study and examinations for the award of the B. Voc degree.

Hereafter **programme** means **B. Voc. Programme** , **B.Voc. programme** means **B.voc. Food Technology** (Food Processing & Safety Management) **programme** ,**college** means programme who conducts the programme and university means **UNIVERSITY OF CALICUT**

2. Objectives of the programme

- a) To provide judicious mix of skills relating to a profession and appropriate content of General Education.
- b) To ensure that the students have adequate knowledge and skills, so that they are work ready at each exit point of the programme.
- c) To provide flexibility to the students by means of pre-defined entry and multiple exit points.
- d) 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.
- e) To provide vertical mobility to students coming out of 10+2 with vocational subjects.

3. Programme Outcomes (POs)

Program outcomes are

- a) They should live with moral ethical value and live in the society with responsible citizen
- b) They should be able to communicate with others effectively
- c) They should take readily any challenge before them and solve those problems persist
- d) They must understand the environmental issues and to accept the adaption

4. Programme Specific Outcomes (PSOs)

Programme Specific Outcomes are

- a) They will demonstrate knowledge of Food Chemistry, Food Microbiology, Food science and Food engineering.
- b) They will demonstrate an ability to identify, formulate and solve processing problems related to food sector/industry.
- c) They will able to focus on the importance of safe processed nutritious food.

- d) They will be get exposure to various technologies aspect of Food product preparation.
- e) They will demonstrate an ability to design or process food products as per the needs and specifications.
- f) They will demonstrate an ability to work in Food industries, research organization and teaching.
- g) They will demonstrate skills to use modern tools and equipment to analyze food prone infection and food spoilage.
- h) They will demonstrate knowledge of professional and ethical responsibilities.
- i) They will be able to understand economic importance of food products and food laws.
- j) They will show the understanding of impact of technological solutions on the society and also will be aware of contemporary issues.
- k) They will develop confidence for self-education and ability for life-long learning.

5. Duration of Programme

Programme is about six semesters distributed over a period of three academic years. Each semester has 90 working days inclusive of all examinations.

6. Academic Week

A unit of five working days with six contact hours of one hour duration on each day. A sequence of 18 such academic weeks (90 working days) constitute a semester.

7. Semester

A term consisting of 18 weeks (16 instructional weeks and 2 weeks for examination)

- Total credits in a semester are 30 (equivalent to 450 hours).
- For final semester internship and project, total credit is 30 with duration of 900 hrs.

8. Course

It is portion of the subject matter to be covered in a semester. A semester contains five or six such courses from general and skill development areas

9. Course Outcomes (COs)

Course outcomes are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally, three or more course outcomes are specified for each course based on its weightage. They are listed along with the detailed syllabus of each course.

10. General terms , definitions ,abbreviations and their expansion

- a) **B. Voc:** Bachelor of Vocation- a scheme introduced by UGC for skill development based higher education as part of college /university education.
- b) **NSQF:** National Skills Qualifications Framework is a quality assurance framework. Under NSQF, the learner can acquire the competency needed at any level through formal, nonformal or informal learning. B.Voc programme is mapped as NSQF Level 5, 6 and 7.

c) **National Occupational Standards (NOS) or Occupational Standards (OS):** defines one key function in a job role. NOS specify the standard of performance an individual must achieve when carrying out a function in the workplace.

d) **Qualification Pack (QP) :** QP defines the set of NOS / OS which are aligned to Job Roles. Qualification Pack certifies a person for a specific job role.

e) **Job Role:** Job role defines a unique set of functions that together form unique employment opportunity in an organization.

f) **Sector:** Sector refers to conventional branch. Sectors and specializations for BVoc programmes shall be considered as per the guidelines of BVoc published by UGC.

g) **Exit Level:** B.Voc has multiple exit points at each year and successfully completing a year (2 semesters) the candidate will be awarded Diploma. Higher Diploma and/or B.Voc Degree will be awarded accordingly mentioned (in Item 5)

h) **Credit:** A unit of academic input measured in terms of weekly contact hours /course contents assigned to a course

i) **Extra Credit:** The additional credit awarded to a student over and above the minimum credits required in a programme, for achievements in co-curricular activities and social activities conducted outside the regular class hours, as decided by the university. For calculating CGPA, extra credits will not be considered.

j) **Letter Grade** or simply **Grade** in a course is a letter symbol (O, A+, A, B+, B, C, P, F, I and Ab). Grade shall mean the prescribed alphabetical grade awarded to a student based on his/her performance in various examinations. The Letter grade that corresponds to a range of CGPA is given in Annexure-I.

k) **Grade point (G)** Each letter grade is assigned a Grade point (G) which is an integer indicating the numerical equivalent of the broad level of performance of a student in a course. Grade Point means point given to a letter grade on 10 point scale.

l) **Semester Grade Point Average (SGPA)** is the value obtained by dividing the sum of credit points obtained by a student in the various courses taken in a semester by the total number of credits in that semester. SGPA shall be rounded off to three decimal places. SGPA determines the overall performance of a student at the end of a semester.

m) **Credit Point (P)** of a course is the value obtained by multiplying the grade point (G) by the credit (C) of the course: $P = G \times C$. Cumulative Grade Point Average (CGPA) is the value obtained by dividing the sum of credit points in all the semesters taken by the student for the entire programme by the total number of credits in the entire programme and shall be rounded off to three decimal places.

n) **Grade Card** means the printed record of students' performance, awarded to him / her.

o) **Course Teacher:** A teacher nominated by the Head of the Department shall be in charge of a particular courses.

p) **BVoc Steering Committee:** A University Level Committee (Refer clause 19)

q) **Strike off the roll:** A student who is continuously absent for 14 days without sufficient reason and proper intimation to the Principal of the college shall be removed from the roll.

11. Programme structure

The programme is a mix of General Education Components (GEC), Skill Development Components (SDC) and Ability Enhancement Courses/Audit Courses.

A. General Education Components (GEC)

a) GEC courses A01-A04 is taught by English teachers and A07-A08 by teachers of additional languages respectively. GEC courses A11-A14 are offered by departments teachers of SDC courses concerned.

b) The courses (A11-A14) under LRP (Alternative Pattern), as per the regulations of CBCSS UG 2019. **of group 2.** Industrial Chemistry, Polymer Chemistry, Food Science and Technology.

No	Semester	Course No	Course Code	Course Name
1	1	1.1	A01	ENG1A01
2		1.2	A02	ENG1A02
3		1.3	A07(3)	MAL1A07(3) HIN 1A07 (3) ARA1A07(3)
4	2	2.1	A03	ENG2A03
5		2.2	A04	ENG2A04
6		2.3	A08(3)	MAL2A08 (3) HIN 2A08 (3) ARA2A08(3)
7	3	3.1	A11	Basic Numerical Skill
8		3.2	A12	Informatics & Emerging Technologies
9	4	4,1	A13	Entrepreneurship and Environmental Sciences
10		4.2	A14	Nutrition & Health

B. Skill Development Components (SDC) details of the courses are given in the scheme and structure of the programme

Skill Gaps Identified:

Global food requirements could be met through agricultural inputs that should be processed perfectly without any wastage. The potential of food processing sector is identified with the scope of development of new processes, preservation techniques, food packaging and safety

aspects. Considering the concern of the people about concept of food safety, curriculum involves all aspects of Food Processing and Safety Management.

C. Ability Enhancement Courses/Audit Courses (AEC /AC): These are courses which are mandatory for a programme but not counted for the calculation of SGPA or CGPA. There is one Audit course each in the first four semesters. These courses are not meant for class room study. The students can attain only pass (Grade P) for these courses. At the end of each semester there will be examination conducted by the college from a pool of questions (Question Bank) set by the University. The students can also attain these credits through online platform like SWAYAM, MOOC etc (optional). The list of courses in each semester with credits is given below

Course name	credit	Semester
Environment Studies	4	1
Disaster Management	4	2
*Human Rights /Intellectual Property Rights /Consumer Protection	4	3
*Gender Studies/Gerontology	4	4

D. Electives: Students are permitted to take elective courses available in the programme

Credit Distribution of B.Voc. Food Tech.

Semester	General Education Component				Skill Development Component	Total
	English	Additional Language	General			
I	3+3	4			20	30
II	4+4	4			18	30
III		-	4	4	22	30
IV		-	4	4	22	30
V	-	-	-	-	30	30
VI	-	-	-	-	30	30
Total	14 Credits (350 Marks)	8 Credits (200 Marks)	16 credits (400 Marks)		142 Credits (2900 Marks)	180
	38 Credits (950 Marks)				142 credits(2900)	3850

Mark Distribution

Subject	Marks Alloted	Total	G.Total
English	2x75 2x100	350	550
Additional: Mal/Arabic.....	2x100	200	
GEC	4x100	400	400
SDC	23x100, 2x200, 2x75 1x50	2900	2900

12. Credit System

a) A student is required to acquire a total of 180 credits for the completion of the programme which shall be counted for SGPA and CGPA.

b) Each semester has a credit of 30..

c) **Extra Credits:** The maximum credit acquired under extra credit will be 4. If more extra credit activities are done by a student, that will be mentioned in the grade card. Extra credits are mandatory for the programme. Extra credits will be awarded to students who participate in activities like NCC, NSS, and Swatch Bharath. Extra credits are not counted for SGPA or CGPA.

d) Credit Assessment

- One Credit would mean equivalent of 15 periods of 60 minutes each, for theory, practicals / workshops / IT and tutorials;
- For internship/field work 1 credit = 30 periods of 60 minutes each.

13. Admission

A. Eligibility

a) The admission to all B Voc programme will be as per the rules and regulations of the University for UG admissions.

b) The eligibility criteria for admission shall be as announced by the University from time to time.

c) Basic eligibility for B.Voc is 10+2 of physics, chemistry, biology and mathematics or physics, chemistry, mathematics and computer science or VHSE in Agriculture or Food Science

d) Separate rank lists shall be drawn up for reserved seats as per the existing rules.

h) Grace Marks may be awarded to a student for meritorious achievements in co-curricular activities such as Sports/Arts/ NSS/NCC/ Student Entrepreneurship. i) Preferred subjects & index mark calculations will be decided by the Board of Studies (FT)

B. Diploma Holders Diploma holders (after 10+2) in the parent courses, approved by the University, who satisfies eligibility criteria can be admitted to the higher diploma (3 rd semester) based on the availability of the seats and is under the sole discretion of the principal / Governing Council of the college.

C. Reservation for Vocational Students 25 marks weightage in index mark shall be given to all B.Voc programmes to compute ranking of candidates who successfully completed VHSE/HSE with vocational / NSQF course general to all vocational students at Higher secondary level.

D. Reservation /Quota:The reservation rules for Government/Aided Colleges are as same as that of the regular UG programmes conducted in colleges affiliated to the university.

E. Readmission

a) There shall be provision for Readmission of students in CBCSS VUG 2021.

b) The Principal can grant readmission to the student, subject to the conditions detailed below and inform the matter of readmission to the Controller of Examinations within one month of such readmission.

c) This readmission is not to be treated as college transfer.

d) There should be a gap of at least one semester for readmission.

e) The candidate seeking readmission to a particular semester should have registered for the previous semester examination.

f) Readmission shall be taken within two weeks from the date of commencement of the semester concerned.

g) For readmission, the vacancy should be within the sanctioned strength in the college.

h) If change in scheme occurs while readmission, provision for credit transfer is subject to common guidelines prepared by Board of Studies/ Faculty concerned. For readmission to CBCSS VUG 2021 involving scheme change, the Principal concerned shall report the matter of readmission to Controller of Examinations with the details of previous semesters and course undergone with credits within two weeks in order to fix the deficiency/excess papers.

F. Multiple Entry

The students can discontinue after the successful completion of 2nd semester or 4th semester can re-join to the programme as lateral entry to 3rd or 5th semester respectively. In such cases, the multiple entries shall be completed within 6 years from the date of first registration of the programme.

When Re-joining through multiple entry, the following points to be considered:

1. If re-joining is sought for a student of this college and in the same programme, the principal / B.voc Governing Council of the college can grant the readmission.
2. In all other cases in multiple entry, readmission can be granted only after getting the approval from B.Voc Steering Committee of the university.
3. Rejoining the programme will be allowed to only if the candidate has secured a minimum CGPA of 2.5.
4. The candidate should remit the fees prevailing at that time.

14. EXAMINATION

- a) There shall be end semester examinations at the end of each semester.
- b) Practical examinations shall be conducted by the college as prescribed by the Board of Studies (FT). External viva-voce, if any, shall be conducted along with the practical examination/project evaluation.
- c) The medium of examination is in English only
- d) A student shall be permitted to appear for the semester examination, only if he or she secures not less than 75%attendance in each semester. Practical Examination shall be conducted by the college at the end of 2nd,4th & 6thsemester

e) Audit course

The student should pass all the audit course examinations before the commencement of fifth semester examination.

f) Improvement course

Improvement of a particular semester can be done only once. The student shall avail of the improvement chance in the succeeding year after the successful completion of the semester concerned. The students can improve a maximum of two courses in a particular semester. The internal marks already obtained will be carried forward to determine the new grade/mark in the improvement examination (for regular students). If the candidate fails to appear for the improvement examination after registration, or if there is no change in the results of the improved examination, the mark/grade obtained in the first appearance will be retained. Improvement and supplementary examinations cannot be done simultaneously.

g) Moderation

Moderation is eligible as per the existing rules of the academic council.

15. EVALUATION AND GRADING : Mark system is followed instead of direct grading for each question. For each course in the semester letter grade and grade point are introduced in 10-point indirect grading system

Method of Indirect Grading

Evaluation (both internal and external) is carried out using Mark system .The Grade on the basis of total internal and external marks will be indicated for each course, for each semester and for the entire programme.

Ten Point Indirect Grading System

% of Marks (Both Internal & External put together)	Grade	Interpretation	Grade point Average (G)	Range of grade point	Class
95 and above	O	Out standing	10	9.5-10	First Class with Distinction
85 to below 95	A+	Excellent	9	8.5-9.49	
75 to below 85	A	Very good	8	7.5-8.49	
65 to below 75	B+	Good	7	6.5-7.49	First Class
55 to below 65	B	satisfactory	6	5.5-6.49	
45 to below 55	C	Average	5	4.5-5.59	Second Class
35 to below 45	P	Pass	4	3.5-4.49	Third Class
Below 35	F	Failure	0	0	Fail
Incomplete	I	Incomplete	0	0	Fail
Absent	Ab	Absent	0	0	Fail

B. Course Evaluation

The evaluation scheme for each course shall contain two parts internal assessment and external assessment.

1) Internal Assessment

- a) 20% of the total marks in each course are for internal examinations.
- b) The internal assessment shall be based on a predetermined transparent system involving written tests, Class room participation based on attendance in respect of theory courses and lab involvement, records and attendance in respect of Practical Courses.
- c) Internal assessment of the project will be based on its content, relevance, method of presentation, final conclusion and orientation to research aptitude.

To ensure transparency of the evaluation process, the internal assessment marks awarded to the students in each course in a semester shall be notified on the notice board at least one week before the commencement of external examination. There shall not be any chance for

improvement for internal marks. The course teacher(s) shall maintain the academic record of each student registered for the course, which shall be forwarded to the University by the college Principal after obtaining the signature of both course teacher and Head of the Department. The Split up of marks for Test paper and Class Room Participation (CRP) for internal evaluation are as follows.

Distribution of Marks for Theory 4 to 5 credits (Max Internal 20)

Attendance		Test paper		Seminar/Assignment/Viva	
85% and above	4 marks	85%-100	8 marks	Outstanding	8 marks
75- <85%	2 marks	65 to 85%	6 marks	Excellent	7 marks
50- < 75%	1 mark	55 to 65%	4 marks	Very good	6 marks
		45 to 55%	3 marks	Good	5 marks
		35 to 45%	2 marks	Average	4 marks
		Less than 35	1 Marks	Poor	1 Mark
Maximum	4 marks	Maximum	8 marks	Maximum	8 marks

Internal Test Papers - 60marks Pattern

Duration	Pattern	No. of Questions	Marks	Ceiling of Marks
1 hour	Short answer	6	5x2	10
	Paragraph	4	2x5	10
	Essay	2	1x10	10
Total marks				30

Distribution of Marks for Theory 1 to 3 credits (Max Internal 15)

Attendance		Test paper		Seminar/Assignment/Viva	
85% and above	3 marks	85%-100	6 marks	Outstanding	6 marks
75- <85%	2 marks	65 to 85%	5 marks	Excellent	5 marks
50- < 75%	1 marks	55 to 65%	4 marks	Very good	4 marks
		45 to 55%	3.0 marks	Good	3 marks

		35 to 45%	2 marks	Average	2 mark
		Less than 35	1 Marks	Poor	1 Mark
Maximum	3 marks	Maximum	6 marks	Maximum	6 marks

Internal Test Papers -80 marks pattern

Duration	Pattern	Total number of questions	Marks for each question	Ceiling of marks
1.5 Hour	Short answer	6	5x2	10
	Paragraph	4	4x5	20
	Essay	2	1x10	10
Total marks				40

Distribution of Marks for Practical 4-5 credits

Components	Maximum 20 Marks
Attendance	5
Lab performance	5
Viva-voce	10

Distribution of Marks for Practical 1-3 credits

Components	Maximum 15 marks
Attendance	5
Lab performance	2.5
Viva-voce	7.5

2) External Evaluation

- a) External evaluation carries 80% of marks.
- b) All question papers shall be set by the university.
- c) The external question papers may be of uniform pattern with 80/60 marks
- d) 2/3 credits will have an external examination of 2 hours duration with 60 marks and courses with 4/5 credits will have an external examination of 2.5 hours duration with 80 marks.
- e) The external examination in theory courses is to be conducted by the university with question papers set by external experts. The evaluation of the answer scripts shall be done by examiners based on a well-defined scheme of valuation and answer keys shall be provided by the university.

f) The external examination in practical courses shall be conducted by two examiners – one internal and an external, the latter appointed by the university. The practical board meeting should be conducted before conducting the external practical examination with the concerned examiners. The instructions for conducting the practical examinations, the mark distribution, question paper distribution and related matters should be discussed in the practical examination board meeting. The scheme of valuation must be strictly followed so as to ensure uniformity.

Theory Question Paper pattern (for 60 marks/1 to 3 Credits)

Duration	Pattern	No. of Questions	Marks	Ceiling of Marks
2 Hours	Short answer	12	2	20
	Paragraph	7	5	30
	Essay	2	1x10	10
Total Marks				60

Theory Question Paper pattern (for 80 marks/4 to 5 Credits)

Duration	Pattern	No. of Questions	Marks	Ceiling of Marks
2.5 Hours	Short answer	15	2	25
	Paragraph	8	5	35
	Essay	4	2x10	20
Total Marks				80

Practical Exam Pattern of 4-5credits

Record	Procedure	Work done	Spot test	Viva-voce	Total
5	5	20x2	20	10	80

Practical Exam Pattern 1-3credits

Record	Procedure	Work done	Spot test	Viva-voce	Total
5	5	15x2	10	10	60

C. Revaluation

In the new system of grading, revaluation is permissible. The prevailing rules of revaluation are applicable to CBCSS VUG 2021. Students can apply for photocopies of answer scripts of

external examinations. Applications for photocopies/scrutiny/revaluation should be submitted within 10 days of publication of results. The fee for this shall be as decided by the University.

D. Internship and Project

a) Internship or the mini/main project should be carried out in the industry, not necessarily with industry partner. The major idea for internship is to implement the things learned and to get a real life experience.

b) The Evaluation process follows 20% internal assessment & 80% external assessment.

c) There will be internship/project at the end of 2nd and 4th semesters.

d) The sixth semester includes one internship and project for the whole semester along with a term paper. Every student shall undergo one internship for the whole semester and along with that they should do a project based on their internship. At the end of the semester they should submit internship report and project.

e) Every student will be assigned an internal guide, allotted from the parent department concerned or an expert available in the college appointed by the principal or the head of the department. The student has to make regular discussions with the guide while choosing the subject/area and throughout the life time of the project.

f) At least three reviews will be conducted to evaluate the progress of work.

g) External examination is conducted as single. The evaluation (internal as well as external) will be done separately for internship and project. In the mark sheet and Grade Card, the split up mark will be shown.

h) External examiner is allotted by the college from the approved examination panel and a faculty from the institution. External examiner may be from the industry if found in the panel.

i) Students should submit a report of their work. A valid certificate of internship from the organization should be produced as a proof that the work is carried out in the respective organization. Attendance statement also should be produced.

j) Students are required to make the presentations of their work to present before the panel of examiners. A viva will be conducted based on the report and students are supposed to clarify the queries regarding their work.

Mark distribution for Mini Project/internship

Distribution	External	Internal
Report	40	5
Viva-voce	20	10
Total	60	15

Mark distribution for internship

Distribution	External	Internal
Report	100	10
Viva-voce	60	30
Total	160	40

Mark distribution for Project

Marks Distribution	Total marks	Internal Assessment Marks
Topic selection	20	5
Result	40	5
Presentation	30	10
Report/Dissertation	20	10
Viva-voce	50	10
Total	160	40

E. Evaluation of Audit courses

The examination shall be conducted by the college itself from the Question Bank prepared by the University. The Question paper shall be of 100 marks of 3 hour duration.

F. Evaluation of Term Paper / Report/Thesis

The term paper shall be in the sixth semester along with internship and project. It should be in the standard format which is eligible for publishing. It has no external evaluation but only internal assessment.

G. Minimum for pass

Each course pass percentage is 35% and above. The successful completion of all the courses prescribed for the diploma/degree programme with P grade shall be the minimum requirement for the award of diploma/degree.

Notes: 1. For Project/internship, the minimum for a pass shall be 50% of the total marks assigned to the respective examination. A student who does not secure this pass marks in Project/internship will have to repeat the respective subject.

2. If a candidate has passed all examinations of B.Voc. Programme (at the time of publication of results of last semester) except Internship and Project in the last semester, a re-examination for the same should be conducted within one month after the publication of results. Each candidate should apply for this Save-A-Year examination within one week after the publication of last semester results.

H. Results

a) A minimum of 20% marks in external evaluation is needed for a pass in a course. But no separate pass minimum is needed for internal evaluation. No separate grade/mark for internal and external will be displayed in the grade card; only an aggregate grade will be displayed. Also the aggregate mark of internal and external are not displayed in the grade card.

b) student who fails to secure a minimum grade for a pass in a course is permitted to write the examination along with the next batch. After the successful completion of a semester, Semester Grade Point Average (SGPA) of a student in that semester is calculated using the formula given below. For the successful completion of a semester, a student should pass all courses. However, a student is permitted to move to the next semester irrespective of SGPA obtained

SGGPA of the student in that semester is calculated using the formula

$$\text{SGPA} = \frac{\text{Sum of the Credit points of all courses in a semester}}{\text{Total Credits in that semester}}$$

The Cumulative Grade Point Average (CGPA) of the student is calculated at the end of a programme. The CGPA of a student determines the overall academic level of the student in a programme and is the criterion for ranking the students. CGPA can be calculated by the following formula

$$\text{CGPA} = \frac{\text{Total credit point obtained in 6 semesters}}{180}$$

16. AWARD OF DEGREE

The successful completion of all the courses (General Education Components, Skill Development Components and Audit courses) prescribed for the degree programme with 'P' grade shall be the minimum requirement for the award of degree.

Levels of Awards

B. Voc is a programme with multiple exits. Following table shows the various certificates and their duration.

Awards	Duration	NSQF Levels
Diploma in Baking, Fruits & vegetable Technology	2 semester	Level 5
Advanced Diploma in Food Processing Technology	4 semester	Level 6
B. Voc Degree in Food Processing & Safety Management	6 semester	Level 7

- a) Students are free to exit at any point in the duration of the programme.
- b) Only those students who successfully complete the courses and clear the examination are eligible for the certificate.
- c) Separate certificate will be awarded for each year for successful candidates. A candidate who successfully completes first two semesters shall be awarded a Diploma Certificate, first four semesters shall be awarded an Advanced Diploma Certificate and clearing all the semester shall be awarded B.Voc Degree certificate.
- d) Students who fail in any course may be allowed to move the higher level but won't be eligible for any certificates until he/she clears previous courses.
- e) B. Voc degree will confer to those whose successfully complete the diploma, higher diploma and internship and project at the sixth semester

Scope of the programme

Sector Skill Council	Food Processing
Sub Sector	Fruits and Vegetables. Food Grain Milling Dairy Products Meat and Poultry Fish and Sea Food Bread and Bakery Packaged food
NSQF Level	QP Code/NOS/Job Role
Level 5(1 year completion)	Plant Baker -FIC/Q5001 Milling Technician- FIC/Q1002 Supervisor-Fruits and Vegetables Processing-FIC/Q0109 Artisanal Wine Maker- FIC/Q0201
Level 6 (2 Year completion)	Quality Assurance Manager-FIC/Q7602 Food Microbiologist- FIC/Q7603 Food Regulatory Affairs Manager-FIC/Q9002
Level 7(3 Year completion)	Production Manager- FIC/Q9003

B.Voc. Programme – Structure, Work load and Credit distribution

Sem No	Course No.	Course code	Name of the course	Credits	Marks		
					Internal	External	Total
1	1.1	A01	ENG1A01-English	3	15	60	75
	1.2	A02	ENG1A02-English	3	15	60	75
	1.3	A07(3)	MAL1A07(3) HIN 1A07 (3) ARA1A07(3)- Additional Language	4	20	80	100
	1.4	SDC1FP01	Introduction to Food Science & Technology	5	20	80	100
	1.5	SDC1FP02	Food Chemistry	5	20	80	100
	1.6	SDC1FP03	Food Microbiology	5	20	80	100
	1.7	SDC1FP04	Cereals, Pulses, oilseeds & Confectionery Technology	5	20	80	100
Audit course I							
2	2.1	A03	ENG2A03-English	4	20	80	100
	2.2	A04	ENG2A04-English	4	20	80	100
	2.3	A08(3)	MAL2A08 (3) HIN 2A08 (3) ARA2A08(3) Additional Language	4	20	80	100
	2.4	SDC2FP05	Technology of Fruits , Vegetable products and Post-harvest Management	5	20	80	100
	2.5	SDC2FP06(P)	Basic concepts in Laboratory Practices, Techniques and Food chemistry Practical	5	20	80	100
	2.6	SDC2FP07(P)	Plant Food Products Practical	5	20	80	100
	2.7	SDC2FP08 Pr	Mini Project	3	15	60	75
Audit Course II							
3	3.1	A11	Basic Numerical Skill	4	20	80	100
	3.2	A12	Informatics & Emerging Technologies	4	20	80	100
	3.3	SDC3FP09	Basic Food Quality & Safety	4	20	80	100
	3.4	SDC3FP10	Business Management	5	20	80	100
	3.5	SDC3FP11	Food Preservation Technology	4	20	80	100
	3.6	SDC3FP12	Food Packaging Technology	4	20	80	100
	3.7	SDC3FP13	Dairy Technology	5	20	80	100
Audit Course III							
4	4.1	A13	Entrepreneurship and Environmental Sciences	4	20	80	100
	4.2	A14	Nutrition & Health	4	20	80	100
	4.3	SDC4FP14	Spices & Plantation Products Technology	5	20	80	100
	4.4	SDC4FP15	Beverage Technology	4	20	80	100
	4.5	SDC4FP16	Technology of Animal Products	5	20	80	100
	4.6	SDC4FP17	Food Engineering	4	20	80	100
	4.7	SDC4FP18(P)	Animal & Dairy Products Practical	4	20	80	100
Audit Course IV							
5	5.1	SDC5FP19	Food biotechnology	4	20	80	100
	5.2	SDC5FP20	Food Toxicology	2	15	60	75
	5.3	SDC5FP21	Instrumental Food Analysis & Techniques	4	20	80	100
	5.4	SDC5FP22	Food Safety Regulation & Standards	5	20	80	100
	5.5	SDC5FP23	Food Supply Chain & Marketing Management	5	20	80	100
	5.6	SDC5FP24	Food Quality Management & Auditing	5	20	80	100
	5.7	SDC5FP25(P)	Analysis of Foods Practical	5	20	80	100
6	6.1	SDC6FP26Pr	Internship, Project Work & Term paper	14+14 + 2	40+40 +50	160+160	450
	Total				180	810	3040

SEMESTER I

Course code	Title of course	Hours per week	No. of credits	Total credits
A01	ENG1A01-English Transaction	3	3	30
A02	ENG1A02-English Ways with words	3	3	
A07(3)	MAL1A07(3) HIN 1A07 (3) ARA1A07(3)-Additional Language	4	4	
SDC1FP01	Introduction to Food Science & Technology	5	5	
SDC1FP02	Food Chemistry	5	5	
SDC1FP03	Food Microbiology	5	5	
SDC1FP04	Cereals, Pulses, oilseeds & Confectionery Technology	5	5	
	Audit Course I*		4*	

* Credit will not be counted for CGPA or SGPA calculation

SDC1FP01 INTRODUCTION TO FOOD SCIENCE & TECHNOLOGY (5 CREDITS)

Objectives

The objective of this paper is to provide a single platform to acquire knowledge related to food like its composition, nutritive value, additives, assessment, food journals and research institutes.

Learning outcomes

After completion of this course students will get

- The nature of food & its composition
- Able to analyze sensory evaluation of products using survey panels or consumers
- To understand sources of additives
- Information on different food journals which covers scientific and technological updates of food related things
- To study various research institutes advanced in area of food

Unit I (15 hrs)

Introduction-Scope of food science and Technology. Functions of food. Nutrients, Water, Carbohydrates, Proteins, Lipids, Vitamins and Minerals.

Unit II (25 hrs)

Composition and nutritive value

Pulses & Legumes, Nuts & Oilseeds, Meat, Fish, Egg and Milk Structure and composition of wheat and Rice. Classification and Composition of Fruits, Vegetables and Spices.

Unit III (10 hrs)

Food Quality Assessment -Sensory assessment-Appearance of food- visual perception, colour of foods, smell, flavour and taste. Threshold tests, difference tests, ranking test & hedonic scale

Unit IV (10 hrs)

Food Additives-Preservatives, colouring agents, flavour and flavour enhancer, Anti-oxidants, Artificial sweeteners, stabilizers, thickening agents, anticaking agents, bleaching and maturing agents, flour improvers, leavening agents, surface active agents

Unit V (5 hrs)

Health foods Functional foods, Prebiotics, Probiotics, Nutraceuticals, organic foods, GM foods

Unit VI (10 hrs)

Food Research & Food Technology updates-Major centers of food research in India – CFTRI, DFRL, NIFTEM, IIFPT & CIFT. Major Food Industries in India. Journals of Food Science & Technology, Indian Food Industry, Beverage Food World, Indian Food Packer, AFST (I)

References

1. Potter NN , Hotchkiss JH. Food Science. CBS publishers and distributors
2. S. Manany, N S. Swamy Food Facts and Principles. New Age International Publishers
3. Murano, Peter S. Understanding Food Science and Technology .Thomson
4. Sumati R Mudambi , Rajagopal M V. Fundamentals of Food and Nutrition. New Age International Publishers
5. Shubhangini A Joshi . Nutrition and Dietics. Tata McGraw Hill Education Private Limited
6. Vijaya Khader. Text Book of Food Science and Technology. ICAR
7. Swaminathan M. Food Science Chemistry and Experimental Foods. Bappco

Journals:

- a. Indian Food Industry
- b. Food packer
- c. Journal of Food Science and Technology
- d. Beverage Food World

SDC1FP02 FOOD CHEMISTRY (5 CREDITS)

Objectives

It provide a knowledge of chemical processes and interactions of all biological and non-biological components of food

Learning outcomes

After this course the students will able to

- Understand the structure and functional properties of food nutrients.
- To get exposure on the importance of physico chemical properties in food products
- Knowledge on minor constituents and their relevance.

Unit I (15 hrs)

Carbohydrates -Classification, properties and reactions of

- 1) Monosaccharides: Glucose & Fructose
- 2) Oligosaccharides : Maltose, lactose. Sucrose- properties- crystallization and inversion.
- 3) Polysaccharides: starch : components of starch, gelatinization, retrogradation, modified starch. Cellulose, hemicellulose, pectic substances, gums, dietary fibre.

Unit II (15 hrs)

Proteins-Introduction to food protein, structure of protein, classification of proteins, amino acids, physicochemical properties, denaturation, reactions, protein determination. Qualitative analysis of protein, Protein estimation-Kjeldahl's method

Unit III (15 hrs)

Lipids-Classification, fatty acids, saturated, unsaturated, polyunsaturated fatty acids, chemical properties, reactions, rancidity, auto-oxidation, antioxidants.

Unit IV (15 hrs)

Water-Introduction, physical & chemical properties of water, moisture in foods, methods of moisture determination, hydrogen bonding, Free & bound water

Pigments-Properties and Occurrence: Chlorophyll, Carotenoids, Flavanoids, Anthocyanins, Anthoxanthins, Myoglobin.

Unit V (15 hrs)

Enzymes- Introduction, Definition, Occurrence, Classification. Properties of Enzymes-Specificity, Factors affecting enzyme activity. Enzymes in food Industry

Colloids -Colloidal chemistry, Properties of solutions, Sols & Suspensions, Food colloids.

Emulsion-Emulsion, Types, Emulsifying Agents

References

1. Food and Nutrition M. Swaminathan
2. Fundamentals of Food & Nutrition S R. Mudambi, M.V. Rajagopal
3. Handbook of Food and Nutrition M Swaminathan
5. Food Chemistry O R. Fennema
6. Food Chemistry L H Meyer
7. Foods Facts and Principles N. Shakuntalamanay & M. Shadaksharaswamy
8. Food Science Norman N. Potter
9. Hand book of Analysis and Quality Control of Fruits & Vegetable Products S. Ranganna

SDC1FP03 FOOD MICROBIOLOGY (5 CREDITS)

Objectives

The course is aimed to understand the importance of the microorganisms associated with foods, origin, role and their basic microbiological analysis.

Learning outcomes

After completion of this course students will get

- The students acquire information on the basic structure of microorganisms
- Use of basic microbial methods or the evaluation microbial load
- Knowledge on microbiological control
- Microbial monitoring of fermented foods
- Help to differentiate different type of contamination and various foods by different organisms.

Unit I (10 hrs)

Evolution

History of Microbiology, - theory of spontaneous generation, Germ theory of disease, Koch's postulates, Pure culture concept.

Microscopy

Parts of microscope, Resolving power, Limits of resolution, Refractive index, Magnification.

Light microscope – Bright field, Dark field. Electron microscope-Transmission Electron microscope, Scanning electron microscope.

Unit II (15 hrs)

Microorganisms

Bacteria

Structure, Morphology, Physical condition required for growth, growth curve. Reproduction – Binary fission, Transformation, Transduction and Conjugation. Nutritional requirements- Phototrophs, Chemotrophs, Autotrophs, Heterotrophs.

Fungi

Morphology, Classification, Phycomycetes, Ascomycetes, Basidiomycetes

Yeasts

Structure, Morphology, Reproduction – Budding. Deutromycetes Reproduction-Sexual and Asexual

Virus

Classification, Composition, Morphology, Replication of virus

Unit III (10 hrs)

Culture Media

Bacteriological Media – Selective, Differential, Enrichment Media.

Methods of isolating Pure culture

Serial dilution, Pour plate, streak plate, stroke Culture

Unit IV (10 hrs)

Control of Microorganism

Physical agents – high temperature, low temperature, desiccation, osmotic pressure radiation, filtration.

Chemical agents-Characteristics of an ideal antimicrobial chemical agent, Alcohols, Aldehydes, Dyes, Halogens, Phenols, Acids, Alkalis, Gases

Unit V (15 hrs)

Food spoilage

Sources of contamination, factors responsible for spoilage, factors affecting kinds and number of microorganisms in food. Chemical changes due to spoilage.

Effect of spoilage

Contamination and spoilage of Fruits and Vegetables, Meat & Meat products, Milk & Cream, Cereal & Cereal products, Spoilage of canned food

Unit VI (10 hrs)

Microbial intoxications & Infections

Definition, Exotoxin, Endotoxin, intoxications and infections – sources, symptoms
Methods of Prevention and investigation of food borne disease outbreak

Microbes in fermented foods

Fermented vegetable products, Sauer Kraut, pickles, soy sauces, idli Fermented dairy products – Cheese, yoghurt

Unit VII (5 hrs)

Water & Milk testing 6

Microbiological testing of water & milk

References

1. Banwart GJ ,1989. Basic Food Microbiology. AVI publishers
2. Jay JM, Loessner MJ & Golden D A,2005. Modern Food Microbiology .Springer Verlag
3. Ananthanarayanan R Jayaram Paniker CK ,2009 Text book of microbiology.University Press Pvt Ltd, Hyderabad
4. Prescott, L.M, Harley, J.P and Klein, D.A Microbiology . McGraw Hill New York
5. Frazier J& Westhoff DC,1988. Food Microbiology. McGraw Hill, New York.
6. Pelczar JM & Reid RD . Microbiology. Tata McGraw Hill
7. Stainer R. General Microbiology. MacMillan
8. Black, JG. Microbiology .Principles and Explorations John Wiley

SDC1FP04 CEREALS, PULSES AND OIL SEEDS TECHNOLOGY (5 CREDITS)

Objectives

- To provide an insight on the chemical and technological aspects of cereals, pulses and oil seeds.
- To get an exposure on the milling and baking technology of common cereal based food products.
- To understand the processing technologies of the millets, pulses and oil seeds product formulation and processing,

Learning Outcome

- It will develop a critical understanding of the uniqueness of wheat as a cereal grain in the world food supply.
- Students will learn to appreciate the complex nature of flour and the complexity of modern baking technology
- Students will develop competency to critically evaluate quality of product formulation and processing,

Unit I (20 hrs)

Technology of Wheat and Rice milling and their products

Wheat Milling of wheat, by-products – Whole wheat flour, Maida, semolina, Gluten.

Rice Milling of rice, by-products of rice milling – Husk, Bran, Broken rice Parboiling-Merits and demerits, Curing, Aging of rice, Rice products – Flaked rice, Puffed rice.

Technology of Oats and Barley

Milling and their products

Unit II (25 hrs)

Technology of Bakery products and confectionery

Baking Principles of baking, classification of baked foods.

Bread: Bread making – Role of ingredients, Bread faults & remedies, staling of bread.

Cake: Cake making, Role of ingredients, Types of making, cake faults and remedies.

Biscuit: Biscuits & Cookies, Crackers and Wafers, technology of Biscuits, faults & Remedies.

Confectionary: Raw materials, Hard candy, Toffee, Caramel.

Unit III (5 hrs)

Millets-Pearl millet, Finger millet

Unit IV (12 hrs)

Pulses-Processing- Soaking, Germination, Decortication, Cooking and Fermentation. Changes during germination, Antinutritional factors, Factors affecting cooking time.

Unit V (13 hrs)

Nuts & Oil seeds-Sources, Composition, Processing of oil seeds – Soya bean, coconut. Hydrogenation. Refining of fats & oils, bleaching, de-odourising, hydroxylation, shortening, margarine. Protein isolates, Texturised vegetable protein

References

1. Hui, Y.H, Bakery products, Science and Technology , Black Well publishing, 2006
2. Matz S.A; Bakery Technology and Engineering; 3 edn, CBS Publishers and distributors
3. Faridi H, The science of cookie and cracker production; CBS Publishers and distributors
4. Dendy D A V & Dobraszczyk BJ Cereals and cereal products, Aspen
5. Kent NL 1983Technology of cereals Pergamon press
6. E J Pyler. Bakery science Technology. Vol I, II. Sosland Publications.
7. Manley D. 2000. Technology of Biscuits, Crackers and Cookies. CRC press.
8. Faridi H. Science of Cookie & Cracker Production
9. S. Manany, N S. Swamy Food Facts and Principles. New Age International Publishers
10. Srivastava RP & Kumar S .2003 Fruit and Vegetable preservation Principles and Practices. Interntional Book Distributors

SEMESTER II

Course code	Title of course	Hours per week	No. of credits	Total credits
A03	ENG2A03-English Writing for Academic & professional success	4	4	30
A04	ENG2A04-English Zeitgeist	4	4	
A08(3)	MAL2A08 (3) HIN 2A08 (3) ARA2A08(3) Additional Language	4	4	
SDC2FP05	Technology of Fruits , Vegetable products and Post Harvest Management	5	5	
SDC2FP06(P)	Basic concepts in Laboratory Practices, Techniques and Food chemistry Practical	5	5	
SDC2FP07(P)	Plant Food Products Practical	5	5	
SDC2FP08 Pr	Mini Project	3	3	
	Audit Course II*		4*	

* Credit will not be counted for CGPA or SGPA calculation

SDC2FP05 TECHNOLOGY OF FRUITS, VEGETABLE PRODUCTS AND POST HARVEST MANAGEMENT (5 CREDITS)

Objectives

The objective of this paper is to give an over view on fruits and vegetable production status and importance of preservation

Learning outcome

After completion of this course students will get

- An idea about fruits and vegetable classification
- Able to an
- To understand sources of additives
- Information on different food journals which covers scientific and technological updates of food related things
- To study various research institutes advanced in area of food

Unit I (8 Hrs)

Indian and global scenario on production and processing of fruits and vegetable; Quality requirements of raw materials for processing; sourcing and receiving at processing plants; primary processing: grading, sorting, cleaning, washing, peeling, slicing and blanching; minimal processing.

Unit II (8 Hrs)

Processing for pulp, puree and concentrates, especially from mango, tomato, guava, papaya, apple, pineapple, pomegranate, grapes etc. Using aseptic packaging, canning, RTS fruit beverages, IQF and frozen fruits and vegetables; for peas, mango pulps etc.

Unit III (8 Hrs)

Technology for processed products like pickles, chutneys, sauces particularly from raw mango, lime and other regional fruits and vegetables of importance.

Unit IV (7 Hrs)

Processing of fruits for candies, bars, toffees, jams and jellies, squashes and syrups using locally available fruits like papaya, mango, anola and other under-utilized fruits.

Unit V (8 Hrs)

Dehydration of fruits and vegetables using various drying technologies like sun drying, solar drying (natural and forced convection), osmotic, tunnel drying, fluidized bed drying, freeze drying, convectional and adiabatic drying; applications to raisins, dried figs, vegetables, intermediate moisture fruits and vegetables. Fruit powders using spray drying.

Unit VI (6 Hrs)

Importance & scope of post-harvest management of fruits and vegetables in Indian economy.

Unit VII (7 Hrs)

Morphology, structure and composition of fruits and vegetables; maturity indices and standards for selected fruits and vegetables; methods of maturity determinations.

Unit VIII (7 Hrs)

Harvesting and handling of important fruits and vegetables, various Harvesting tools ; Field heat of fruits and vegetables and primary processing for sorting and grading at farm and cluster level; factors affecting post harvest losses

Unit IX (8 Hrs)

Post-harvest physiological and biochemical changes in fruits and vegetables; ripening of climacteric and non-climacteric fruits; regulations, methods; Storage practices: CA and MA, hypobaric storage, pre-cooling and cold storage, Zero energy cool chamber; Commodity pre treatments - chemicals, wax coating, pre packaging, VHT and irradiation.

Unit X (8 Hrs)

Physiological post harvest disorders - chilling injury and disease; prevention of post harvest diseases and infestation; Handling and packaging of fruits and vegetables; Post Harvest handling system for fruits and vegetables of regional importance such as citrus, mango, banana, pomegranate, tomato, papaya and carrot, jackfruit etc., principles of transport and commercial transport operations.

Reference

1. Kadar AA.1992. Post-harvest Technology of Horticultural Crops. 2nd Ed.Universiity of California.
2. Lal G, Siddapa GS & Tandon GL.1986. Preservation of Fruits andVegetables. ICAR.
3. Pantastico B. 1975. Post Harvest Physiology, Handling and Utilization ofTropical and Subtropical Fruits and Vegetables. AVI Publ.
4. Salunkhe DK, Bolia HR & Reddy NR. 1991. Storage, Processing andNutritional Quality of Fruits and Vegetables. Vol. I. Fruits andVegetables. CRC.
5. Thompson AK. 1995. Post Harvest Technology of Fruits and Vegetables.Blackwell Sci.
6. Verma LR. & Joshi VK. 2000. Post Harvest Technology of Fruits andVegetables. Indus Publ.
7. Barret DM, Somogyi LP &Ramaswamy H. 2005. Processing of Fruits.CRC Press
8. FAO. 2007. Handling and Preservation of Fruits and Vegetables by Combined Methods for Rural Areas- Technical Manual. FAO Agr.Ser. Bull., 149.
9. Fellows P. 2007. Guidelines for Small-Scale Fruit and VegetablesProcessors. FAO Agr. Ser. Bull., 127.
- 10.Salunkhe DK & Kadam SS.1995. Handbook of Fruit Science &Technology: Production, Composition and Processing. Marcel Dekker.
- 11.Somogyi LP. et al. 1996. Processing Fruits - Science and Technology. VolsI, II. Technomic Publ.
- 12.Srivastava RP & Kumar S. 2003. Fruit and Vegetable Preservation -Principles and Practices. International Book Distributors.
- 13.Verma LR & Joshi VK. 2000. Post Harvest Technology of Fruits andVegetables. Indus Publ.

SDC2FP06 (P) BASIC CONCEPTS IN LABORATORY PRACTICES, TECHNIQUES AND FOOD CHEMISTRY PRACTICAL (5 CREDITS)

Objective

- To acquire knowledge on chemical interactions in food
- To evaluate the composition of food
- To recognize the proximate principles in food
- To determine the additives in food

Learning outcomes

- Determining the composition of food
 - Developing laboratory skills
 - Grasping the food chemistry principles
 - Determining the quality of edible oil
 - To acquire knowledge on purity water
-
- **Safety measures while in Lab;** Handling of chemical substances; Use of burettes, pipettes, measuring cylinders, flasks, separatory funnel, condensers, micropipettes and vaccumets; washing, drying and sterilization of glassware; Drying of solvents/chemicals. Weighing and preparation of solutions of different strengths and their dilution; Handling techniques of solutions; Preparation of solutions of acids; Neutralization of acid and bases; Preparation of buffers of different strengths and pH values. Use and handling of microscope, laminar flow, vacuum pumps, viscometer, thermometer, magnetic stirrer, micro-ovens, incubators, sand bath, water bath, oil bath; Electric wiring and earthing. Preparation of media and methods of sterilization

Experiments

- Standardization of NaOH
- Standardization of HCl
- Determination of Moisture using
- Hot air oven b) Distillation method c). Infrared method
- Determination of Acidity & pH
- Determination of T S S
- Qualitative test for carbohydrates – Molisch's test, Benedict's test, Iodine test,
- Anthrone test, Selivanoff's test
- Qualitative Test of Proteins
- Staining techniques – simple staining, gram staining
- Qualitative determination of SO₂

- Qualitative determination of benzoic acid
- Sensory evaluation
- Analysis of Lipids -Determination of Iodine value
- Determination of saponification value
- Determination of peroxide value
- Determination of Free Fatty Acid
- Analysis of Protein -Kjeldahl's methods
- Analysis of Water- Total solids, Acidity of water, Alkalinity of water, Determination of Chloride, Hardness of water.
- Paper chromatography
- Ash content

SDC2FP07 (P) TECHNOLOGY OF PLANT PRODUCTS PRACTICAL (5 CREDITS)

Objectives

- To recognize proximate principles in food.
- To prepare various baked products and confectionary products.
- To know about the importance of each ingredient in the bakery and how it affects the overall product and quality parameters.
- To determine the physical parameters of wheat and rice.

Outcomes

- Operating & maintenance the processing equipment's & machineries
- To make different processed fruit & vegetable based products with quality assurance.
- Acquire an idea about baking and confectionery manufacture and quality control.
- To develop proficiency skill in producing different types of processed fruits & vegetables products.
- Determination of various analysis in gluten.

Experiments

- Determination of Moisture
- Determination of Ash
- Sedimentation value
- Determination alcoholic acidity
- Estimation of Gluten
- Determination of Water absorption power
- Qualitative analysis of gluten – Belshanke value
- Determination of falling number
- Preparation of Bread
- Preparation of Biscuit
- Preparation of Cake
- Determination of Physical parameters of wheat and rice
- Industrial Visit- Bakery Unit
- Industrial Visit –Confectionery Unit
- Industrial Visit- Cereal ,pulses & oilseeds Milling and extraction Unit
- Determination of Sulphur dioxide
- Estimation of Vitamin C
- Estimation of tannin – colorimetric method

- Estimation of alcohol content

- Determination of salt content in pickles
- Determination of reducing sugar
- Lye peeling
- Adequacy of blanching
- Preparation of ketchup
- Preparation of Jam & Jelly
- Preparation of squash

SEMESTER III

Course code	Title of course	Hours per week	No. of credits	Total credits
A11	Basic Numerical Skill	4	4	30
A12	Informatics & Emerging Technologies	4	4	
SDC3FP09	Basic Food Quality & Safety	4	4	
SDC3FP10	Business Management	5	5	
SDC3FP11	Food Preservation Technology	4	4	
SDC3FP12	Food Packaging Technology	4	4	
SDC3FP13	Dairy Technology	5	5	
	Audit Course III*		4*	

* Credit will not be counted for CGPA or SGPA calculation

SDC3FP09 BASIC FOOD QUALITY & SAFETY (4 CRDITS)

Objectives

To understand the concept of safe food and hazards associated with them and to familiarize with hygiene practices, food adulteration, food safety management systems and food regulations

Learning Outcome

- Upon completion of this course students will be able to understand the importance of food safety and hygiene and can apply it at industrial level.
- Students will recognize the national and international standards and practices for food safety and can implement it at industries.
- Students can take new concept of food plant sanitation and apply them to another situation
- Students can implement the updated FSSAI act at analysis as well as production level.
- Students will get a knowledge about food adulteration

Unit I (10 hrs)

Concept of quality: Quality attributes- physical, chemical, nutritional, microbial, and sensory; their measurement and evaluation; Sensory *vis-à-vis* instrumental methods for testing quality. Food Safety and Quality Assurance: quality control of raw materials, in – process food control, quality control of finished products

Unit II (10 hrs)

Importance of Food Safety, Food Hygiene, High risk food, Low risk food, Danger Zone, Personal hygiene. Importance and significance of microorganisms in food safety, intrinsic and extrinsic factors affecting the growth of micro organisms in food.

Unit III (15 hrs)

Food Sanitation and safety: Factors contributing to physical, chemical and biological contamination in food chain, prevention and control of food borne hazards, definition and regulation of food sanitation, sources of contamination, personal hygiene-food handlers, cleaning compounds, sanitation methods, waste disposal strategy (solid and liquid waste) and pest control

Unit IV (15 hrs)

History of food regulations in India. Legislations- Prevention of Food Adulteration act 1954, Food product order (1955), Solvent Extracted Oil, De-oiled Meal and Edible Flour (Control) Order, 1967, Meat Food Products Order (1973), Edible Oils Packaging, 1998, Edible Oils Packaging, 1998, Vegetable Oil Products Order, 1998, Milk & Milk Product Amendment Regulations – 2009

Unit V (10 hrs)

Food adulteration: common adulterants, simple tests for detection of adulteration. Food additives- classification, functional role and safety issues, types of adulteration and recent trends in food adulteration.

References

1. Early, R. (2006) Guide to Quality Management Systems for the Food Industry, Blackie, Academic and professional, London.
2. Gould, W.A and Gould, R.W. (2005) Total Quality Assurance for the Food Industries, CTI Publications Inc. Baltimore.
3. Pomeraz, Y. and MeLoari, C.E. (2008) Food Analysis: Theory and Practice, CBS publishers and Distributor, New Delhi.
4. Bryan, F.L. (2007) Hazard Analysis Critical Control Point Evaluations A Guide to Identifying Hazards and Assessing Risks Associated with Food Preparation and Storage. World Health Organization, Geneva.
5. Kirk, R.S and Sawyer, R. (2005) Pearson's Composition and Analysis of Foods, Longman Scientific and Technical. 9th Edition, England.
6. FAO (2006) Manuals of Food Quality Control. 2-Additives Contaminants Techniques, Rome.

SDC3FP10 BUSINESS MANAGEMENT (5 CREDITS)

Objective

This course is to help the students to get aware towards varied management principles and practices

Learning out comes

After completion of this course the students will able to

- Understand the process of business management and its functions
- Familiarize the students with current management practices
- Understand the importance of ethics in current business
- To acquire knowledge and capability to develop ethical practices for effective management

Unit I (15 Hours)

Concepts of Management – Characteristics of management – Schools of management thought Management and administration – Functions of management – Management by objectives – Management by participation – Management by exception – Management by motivation

Unit II (15 Hours)

Functions of Management: Planning – concept and importance - Decision making – barriers to effective planning – Organizing – concept and importance – different organization models Span of management – Departmentation – Delegation.

Unit III (15 Hours)

Functions of Management: Motivation: – concept and importance – Contributions of McGregor, Maslow and Herzberg – Leadership: – Concept and styles – Leadership traits - situational theory of leadership - Communication: – process and barriers – Control: – concept steps – tools – Coordination: Concept – Principles – Techniques

Unit IV (15 Hours)

Business Ethics: Meaning and scope – Types of ethics – Characteristics – Factors influencing business ethics – Arguments for and against business ethics – Basics of business ethics -Corporate social responsibility - Environmental issues in business – Ethics in advertising –Globalization and business ethics.

Unit V (15 Hours)

Emerging concepts in management – Kaizen – TQM – TPM – MIS – ISO – Change management– Stress management – Fish bone (ISHIKAWA) Diagram – Business eco system – Logistic management.

Reference Books:

1. Boatwright. John R: Ethics and the Conduct of Business, Pearson Education, New Delhi.
2. Gupta. CB; Business management, Sultan Chand & sons
- 3 Koontz, H and Wehrick, H: Management, McGraw Hill Inc, New York.
- 4 Prasad. LM; Principles and Practicd of Management; Sultan Chand & sons
- 5 Stoner. AF and Freeman RE; Management; Prentice Hall of India
- 6 Drucker, Peter, F., Management: Tasks, Responsibilities and Practices, Allied Publishers, New Delhi.
5. R.S Davar; Management Process
6. Rustom & Davan, Principles and Practice of Management.
7. Srinivasan & Chunawalla, Management Principles and Practice.
8. S. V. S. Murthy. Essentials of Management.

SDC3FP11 FOOD PRESERVATION TECHNOLOGY (4 CREDITS)

Objectives

To provide students with fundamental understanding of various food preservation techniques.

Learning Outcome

- Helps to apply major food preservation techniques and explain underlying principles
- Analyse and evaluate novel food processing method including non thermal food processing technique
- Students will develop an understanding of shelf life and nutritional consequences of preservation.
- To get an idea about new product development.

Unit I (8 hrs)

Thermal Processing-Principles and application-Blanching, Pasteurization, Sterilization, Ultra high temperature sterilization, Aseptic processing

Unit II (8 hrs)

Drying-Significance: Natural drying- Sun and Solar drying, Artificial drying- Hot air drying, Drum drying, Spray drying, Dehydro freezing, Freeze drying, Drying pre-treatments – blanching & sulphuring.

Unit III (8 hrs)

Low Temperature Processing-

Refrigeration, Low temperature preservation of Fresh Fruits, Vegetables, Meat & Fish products. Chilling injury.

Freezing, Principle, Freezing rate, Quick freezing, Slow freezing, Types of freezers- Air blast, Contact, Immersion, Fluidized bed and Cryogenic freezers.

Quality of frozen foods- Retrogradation, Protein denaturation, Freezer burn

Unit IV (5 hrs)

Irradiation-Source of ionization irradiation, Dose and Dosimetry, Mode of action, Scope of irradiation.

Unit V (7 hrs)

Fermentation-Principles, Significance, Types of fermentation- Acetic, Lactic and Alcoholic.

Unit VI (8 hrs)

Chemical Preservation-Natural preservatives-Mode of action. Chemical Preservatives - Sulphur dioxide, Benzoic acid, Sorbic acid, Propionic acid, Acetic acid.

Unit VII (8 hrs)

Recent Trends Food preservation applications– Pulsed electric fields, High pressure technology, Ohmic heating, Microwave heating, Ultrasonics, Nanotechnology, Hurdle technology.

Unit VIII (8 hrs)

New Product Development Food needs, consumer preference and Market survey, Steps in new product development

References

1. Fennema Owen R. Principles of food Science. Marcel Dekker, Inc
2. Murano, Peter S. Understanding Food Science and Technology .Thomson
3. Khader, Vijaya Textbook on Food Storage and Preservation Kalyani Publishers
4. Pruthi JS Quick Freezing Preservation of Foods Allied publishers Limited
5. Potter N N.& Hotchkiss 1997 Food Science CBS Publishers
6. Desrosier NW James N,1977 Technology of Food Preservation CBS Publishers
7. Arti Sanhla Food Preservation. Principles and practices
8. Manay,N.S,Shadaksharaswamy,M.,Foods:New Age international (P) publishers, New Delhi 2004
9. Shafiur Rahman M., 1999, Hand book of food preservation. Marcel Dekker, Inc, New York.
- 10.Subbulakshmi G and Udippi S.A Food Processing and PreservationI Foods:New Age international (P) publishers, New Delhi 2001

SDC3FP12 FOOD PACKAGING TECHNOLOGY (4 CREDITS)

Objectives

- To study about food packaging, functions and properties
- To identify various kind of packaging materials
- To realize advanced packaging technologies
- To find out the importance of food labeling and standards

Learning outcome

By the end of this course, the student will be able to:

- Identify the importance of food packaging and other properties
- Clear idea on different packaging materials
- Make knowledge about packaging technologies
- Provide information of food labeling and standards

Unit I (10 hrs)

Introduction-Introduction to Food packaging, Definition, functions & properties

Unit II (10 hrs)

Classification-Classification of Packaging - Primary Secondary and Tertiary packaging, Flexible, rigid and semi rigid packaging Materials

Unit III (10 hrs)

Types of packages-Different forms of food containers, Boxes, Jars, Bottles, Cans, Metal cans, glass containers, plastic containers, pouches, Retort pouches, paper and paperboard. Films and Laminates, Edible films in packaging

Unit IV (10 hrs)

Packing Technologies-Aseptic, Retort, Vacuum, Inert gas, Form -Fill - Seal, Active, Controlled Atmosphere & Modified Atmosphere packaging

Unit V (10 hrs)

Shelf life evaluation- Shelf Life Estimation of packaged foods- oxygen transmission, water

Unit VI (10 hrs)

Food labelling Standard Weights and Measures Act, Packaging Commodity Regulatory Order for food commodities, Packaging symbols, Nutrition labelling

References

1. Gordon L. Robertson, "Food Packaging and Shelf life –A Practical Guide", CRC Press, ISBN-9781420078442, 2010.
2. Coles, R., Dowell, D.M., Kirwan, J. "Food Packaging Technology", Wiley-Blackwell Publishing Ltd, ISBN-9781405147712, 2009.
3. Chiellini, E., "Environmentally Compatible Food Packaging", Wood Head Publishing Ltd and CRC press, ISBN-9781845691943, 2008.
4. M.L.Rooney, "Active Food Packaging", Blackie Academic & Professional Publisher, London, 2012.
5. Gordon L. Robertson, "Food Packaging Principles & Practice", CRC Press, 2006.
6. NIIR Board, "Food Packaging Technology Handbook", National Institute of Industrial Research, New Delhi
7. Davis , E.G Evaluation of tin & plastic containers for foods, CBS publishers New Delhi
8. Mathlouthi, M Food Packaging and Preservation . Aspen
9. Larousse, Jean Food Canning Technology Wiley-VCH
10. Mahadeviah M & Gowramma RV 1996 Food Packaging Materials. Tata McGraw Hill

SDC3FP13 DAIRY TECHNOLOGY (5 CREDITS)

Objectives

- To acquire knowledge about dairy products and their physico-chemical properties
- To obtain informations regarding with their processing methods
- To get details on dairy plant sanitation and hygiene

Learning outcome

After this course students will get

- List of components of milk and their properties
- Exposure on dairy products and processing methods
- Understand concept of dairy by products
- Informations on sanitation and hygiene of dairy plant

Unit I (5 hrs)

Composition- Composition of milk from various sources, factors affecting composition of milk.

Unit II (15 hrs)

Properties-Physical and Chemical properties- Flavour, Colour, acidity, viscosity, Specific gravity, Freezing point, Boiling point, Effect of- heat, enzymes, acids and alkali.

Unit III (10 hrs)

Types of Milk Toned, Double toned milk, Standardized milk, Homogenized milk, and Recombined milk.

Unit IV (10 hrs)

Processing of Milk Processing, distribution and storage of liquid milk

Unit V (20 hrs)

Dairy Products

Cream and Butter Composition, Processing and Technology

Ice cream Technology of Ice cream: Ingredients, formulations, Freezing, Hardening, storage, Distribution and defects. Frozen dessert.

Cheese Introduction, Classification of cheese. Processing of cheese: Cottage and Cheddar.

Fermented milk Products Curd, yoghurt, Acidophilus milk, Kefir, koumiss, Probiotic

Milk powder Whole and skim milk powders, Instant milk powder

Unit VI (5 hrs)

Technology of Dairy by-products Whey protein products

Unit VII (10 hrs)

Dairy plant sanitation Objectives, CIP, Sanitizers

References

1. Sukumar D E. Outlines of Dairy Technology, Oxford University Press.
2. Johnson, Webb .Fundamentals of Dairy Chemistry.CBS Publishers and Distributers
3. Eckles, Clarence, Henry Milk and Milk Products, Tata MCGraw Hill publishers
4. Kurmann, Joseph A. Encyclopedia of Fermented Fresh Milk Products, CBS Publishers and Distributers
5. Atherton, Henry V. Chemistry and Testing of Dairy Products CBS Publishers and Distributers
6. Johnson, Webb Fundamentals of Dairy Chemistry CBS Publishers
7. Ananthakrishnan C P, Khan A Q, Padmanabhan P N. Technology of Milk Processing. Srilakshmi Publishers.
8. Walstra P, Geurts T. Dairy Technology. Marcel Dekker
9. Edgar Spreer. Milk and dairy product technology. Marcel Dekker

SEMESTER IV

Course code	Title of course	Hours per week	No. of credits	Total credits
A13	Entrepreneurship and Environmental Sciences	4	4	30
A14	Nutrition & Health	4	4	
SDC4FP14	Spices & Plantation Products Technology	5	5	
SDC4FP15	Beverage Technology	4	4	
SDC4FP16	Technology of Animal Products	5	5	
SDC4FP17	Food Engineering	4	4	
SDC4FP18(P)	Animal & Dairy Products Practical	4	4	
	Audit Course IV*		4*	

* Credit will not be counted for CGPA or SGPA calculation

SDC4FP14 SPICES & PLANTATION PRODUCTS TECHNOLOGY (5 CREDITS)

Objectives

To understand and aware about the different spices and plantation products, and familiarize with the different processing and properties and establishing good knowledge on the products derived from these spices and the plantation products.

Learning Outcome

- To acquire information on the different spices and plantation products in food chain sector
- Acquiring knowledge on properties and processing of different spices, coffee, cocoa and tea.
- Exposure on the different products and application on available in the current food processing sector

Unit I (15 hrs)

Coffee: Occurrence, chemical constituents; harvesting, fermentation of coffee beans; changes taking place during fermentation; drying; roasting; process flow sheet for the manufacture of coffee powder; instant coffee types of coffee – drip, percolator, vacuum, instant and decaffeinated coffee. technology; chicory chemistry; quality grading of coffee.

Unit II (15 hrs)

Tea: Occurrence, chemistry of constituents; harvesting; types of tea –green, oolong and CTC; chemistry and technology of CTC tea; manufacturing process for green tea and black tea manufacture; instant tea manufacture; quality evaluation and grading of tea. bio-tea, spiced tea, iced tea.

Unit III (15 hrs)

Cocoa: Occurrence, chemistry of the cocoa bean & Composition; changes taking place during fermentation of cocoa bean; processing of cocoa bean; cocoa powder; cocoa butter, cocoa liquor manufacture; chocolates–types, chemistry and technology of chocolate manufacture; quality control of chocolates.,

Unit IV (15 hrs)

Spices: Definition, classification, chemical composition, uses of spices

Major spices: Processing of pepper & Pepper products .

Processing of Turmeric, Ginger, Chillies and Cardamom.

Spice oils & oleoresins and method of manufacture; chemistry of the volatiles; fumigation and irradiation of spices.

Unit V (15 hrs)

Other spices: Cumin, coriander, cinnamon, fenugreek, garlic, mace, clove, mint and vanilla

References

1. Pruthi JS Major Spices of India
2. Pruthi JS Quality Assurance in Spices and Spice Products
3. Banerjee B 2002 Tea production and Processing Oxford university press
4. Minifie BW . 1999 Chocolate , Cocoa and Confectionery Technology Aspen Publ
5. Sivetz M& Foote HE 1963 Coffee Processing Technology. AVI Publ.
6. Amit Krishna De. Spices; Traditional uses and Medicinal Properties
7. S. Manany, N S. Swamy Food Facts and Principles. New Age International Publishers
8. Sanjeev Kumar Sharma, Madhava Naidu M. Science of Coca Processing. Jain Brothers
9. NIIR. 2004. *Handbook on Spices*. National Institute of Industrial Research
10. Board, Asia Pacific Business Press Inc.
11. H Panda, Hand Book on Spices and Condiments, Asia Pacific Business Press Inc

SDC4FP15 BEVERAGES TECHNOLOGY (4 CREDITS)

Objectives:

The main objective of this course is to facilitate students with industrial knowledge in the beverage technology and to understand various processing technologies in alcoholic and non alcoholic beverages.

LEARNING OUTCOMES:

After completion of the course, students will be expected to able to:

- Signify the importance of beverage in food industry
- Develop general knowledge on origin and economic status of beverage industry in India
- Lists various type of beverages
- Understand manufacturing process and quality evaluation of alcoholic and non-alcoholic beverages
- Familiarize brewing technology
- Understand importance of fermentation and carbonation in beverage industry
- Optimize the idea on various water treatment process
- Understand quality standards of water

Unit I (15 hrs)

Types of beverages and their importance; status of beverage industry in India; Manufacturing technology for juice-based beverages; synthetic beverages; technology of still, carbonated, low-calorie and dry beverages; isotonic and sports drinks; role of various ingredients of soft drinks, carbonation of soft drinks.

Unit II (15 hrs)

Specialty beverages based on tea, coffee, cocoa, spices, plant extracts, herbs, nuts, dairy and imitation dairy-based beverages.

Unit III (15 hrs)

Alcoholic beverages- types, manufacture and quality evaluation; the role of yeast in beer and other alcoholic beverages, ale type beer, lager type beer, technology of brewing process, equipments used for brewing and distillation, wine and related beverages, distilled spirits.

Unit IV (15hrs)

Packaged drinking water- definition, types, manufacturing processes, quality evaluation and raw and processed water, methods of water treatment, BIS quality standards of bottled water; mineral water, natural spring water, flavoured water, carbonated water.

References

1. Hardwick WA. 1995. Handbook of Brewing. Marcel Dekker.
2. Hui YH. et al 2004. Handbook of Food and Beverage Fermentation Technology. Marcel Dekker.
3. Priest FG & Stewart GG. 2006. Handbook of Brewing. 2nd Ed. CRC.
4. Richard P Vine. 1981. Commercial Wine Making - Processing and Controls. AVI Publ.
5. Varnam AH & Sutherland JP. 1994. Beverages: Technology, Chemistry and Microbiology. Chapman & Hall.
6. Woodroof JG & Phillips GF.1974. Beverages: Carbonated and Non Carbonated. AVI Publ.

SDC4FP16 TECHNOLOGY OF ANIMAL PRODUCTS (5 CREDITS)

Objectives

- To explain slaughtering methods of different animals
- To substantiate curing methods
- To provide knowledge about animal byproducts and processing
- To learn egg and fish preservation

Learning outcomes

After this course students will get :

- Description of slaughtering methods
- Emphasize on curing methods
- Significance of animal byproducts and processing
- Understand preservation techniques of fish and egg

Unit I (20 hrs)

Slaughter and Inspection of Meat-Humane method, Inspection of meat- Ante mortem and post-mortem inspection.

Slaughter of sheep, pigs, poultry.

Post mortem changes, ageing. Structure of meat, Factors affecting tenderness of meat, Effect of cooking on texture, colour and flavour

Unit II (15 hrs)

Cured Meat-Role of ingredients, Methods of curing, smoking, Processing of Ham, Bacon. Sausage - classification, emulsion, ground sausage, processing, casings, Factors affecting quality of cured meat

Unit III (10 hrs)

By products-Rendering, Feeds, Hides, Skins, Hoofs, Horns.

Unit IV (15 hrs)

Egg-Grading, Changes during storage.

Egg quality- Factors affecting egg quality, Measures of egg quality, Effect of cooking, Factors affecting coagulation, Industrial use of egg.

Preservation of egg Refrigeration, Freezing, Thermal processing, Dehydration, Coating.

Unit V (15 hrs)

Fish & Fish Products-Introduction, Spoilage indices

Preservation Cold storage, freezing, smoking, pickling, canning of fish, drying

Fish products Fish protein concentrate, Fish oils- Body oil, Liver oil, Fish meal, Fish Ensilage, Chitosan, pearl Essence, Glue, Gelatin

References

1. Gracey JF Collins DS Meat HygieneELBS
2. Person AM Gillet T A Processed Meats. CBS publishers
3. Lawrie R A Lawries Meat ScienceTata McGrawHhill
4. Mountney T.Carmen GPrakhurst R Poultry Products TechnologyCBS Publishers
5. Ockerman HW Hancen CL Animal ByproductProcessingElis Horwood
6. Gopakumar K Tropical Fishery Products Oxford
7. Jhingran VG Fish & Fisheries of India Hindustan Publishing Company
8. Biswas KP A Text Book of Fish and Fisheries Technology Tata McGraw hill
9. Stadelman, William J..Egg Science and Technology. CBS.
- 10.Parkhurst, Carmen R .Poultry Meat and Egg Production.CBS

SDC4FP17 FOOD ENGINEERING (4 CRDITS)

Objectives:

The main objective of this course is to teach students the fundamentals of food engineering which ranges from basic engineering principles, based on fundamental physics, to several applications in food processing. To understand concept of unit operations, fluid flow and heat transfer. This will help to understand the basic principles, technology and various equipments of refrigeration, freezing, thermal processing, drying and other food operations.

LEARNING OUTCOMES:

After completion of the course, students will be expected to be able to:

- Understand the application of food engineering during the handling, processing, storage and distribution of food products
- Familiarize fundamental food engineering concepts and develop problem solving skill.
- Develop knowledge in different modes of heat transfer operations
- Understand rheological characteristics of food
- Familiarize working principle of heat exchangers, evaporators, driers and boilers.
- Comprehend the theories of refrigeration and freezing
- Understand concept of Pasteurization technique

Unit I (10 hrs)

Unit operations & Heat transfer Mode of heat transfer– Conduction, Convection, Radiation

Unit II (10 hrs)

Heat exchanger-Classification, contact type heat exchange - Immersion, Non-contact type heat exchanger, Plate Heat exchanger, Scraped surface Heat exchanger, Tubular Heat exchanger, Double & Triple tube Heat exchanger, Shell & Tube Heat exchanger.
Pasteurization: LTLT, HTST, UHT, Pasteurizing equipments.

Unit III (10 hrs)

Refrigeration & Freezing

Refrigeration Principle of refrigeration, Vapour compression refrigeration cycle.
Freezing Principle of freezing & freezing rate.

Unit IV (10 hrs)

Evaporation-Principle, single effect evaporation, multiple effect evaporation.

Types of evaporators - Horizontal tube, Vertical tube, Falling film evaporator, Raising film Evaporator.

Unit V (10 hrs)

Driers & Boilers-Driers Principle, constant rate & falling rate of period of drying.

Types of driers –working principles-types-Drum drier, Cabinet drier, Tunnel drier, Spray drier, Fluidized bed drier.

Boiler- Principle, working of water tube & fire tube boiler.

Unit VI(10 hrs)

Rheology Definition, Rheological characteristics of foods, viscosity, apparent viscosity-Newtonian and Non Newtonian

References

1. Rao D G. Fundamentals of Food Engineering. PHI learning private limited
2. Sahay KM & Singh KK, 1994. Unit operations of Agricultural processing Vikas Publishing House
3. R S Khurmi & J K Gupta, A Textbook of Refrigeration & Air conditioning, S Chand
4. Singh RP, Heldman DR1993 Introduction to Food Engineering Academic Press
5. Romeo. Toledo T Fundamentals Food Process Engineering CBSPublishers
6. Charm SE,Macabe, WL Smith JC & Hariot P 1993. Unit Operations of Chemical Engineering. McGraw Hills.

SDC4FP18 (P) ANIMAL & DAIRY PRODUCTS PRACTICAL (4 CREDITS)

Objectives

- To perform various tests in dairy products
- To find adulteration in milk
- To prepare various milk products
- To evaluate internal and external quality of egg
- To recognize proximate principles of meat & fish

Learning outcomes

- Determination of various components in milk and milk products
- Finding out the adulterants in milk
- Making of khoa, peda etc
- Checking internal and external quality of egg
- Acquire a clear idea about composition of meat & fish

Experiments

- Acidity of Milk & curd
- Fat content in Milk
- Determination of total solids, SNF and specific gravity of milk
- Determination of Total ash in milk
- Acidity of butter
- Moisture content of butter
- Salt content in butter
- Adulteration in milk
- Preparation of Khoa, Peda
- Moisture content in Ghee
- Internal & External quality of egg
- Proximate composition of Meat & Fish

SEMESTER V

Course code	Title of course	Hours per week	No. of credits	Total credits
SDC5FP19	Food biotechnology	4	4	30
SDC5FP20	Food Toxicology	2	2	
SDC5FP21	Instrumental food analysis & techniques	4	4	
SDC5FP22	Food Safety Regulation & Standards	5	5	
SDC5FP23	Food Supply Chain & Marketing Management	5	5	
SDC5FP24	Food Quality Management & Auditing	5	5	
SDC5FP25(P)	Analysis of Foods Practical	5	5	

SDC5FP19 FOOD BIOTECHNOLOGY (4 CREDITS)

Objectives:

To acquaint with the fundamentals and application of biotechnology in relation to raw materials for food processing, nutrition, food fermentations, waste utilization and use better genetic resources.

Course Outcome

- Have developed an understanding of the application of biotechnology in animal, plant and food production.
- Understand the principles of fermentation
- Understand how different biotechnology processes are applied to food product development
- Recognize the impact of biotechnological applications on food supply and consumer acceptance of food products.
- Apply microbiological and molecular biological techniques in food testing.

UNIT I (10 hrs)

Prospectus of biotechnology- definition, scope and applications, Application of Biotechnology in food (Food industries), pharmaceuticals and agriculture, Application of biotechnology for food plant waste utilization, biogas plants. The role of biotechnology. fermented food products (dairy, meat, vegetable). Starter culture development, process development. · Enzymes in the dairy industry: cheese making and whey processing, impact of enzyme technology. · Enzymic processing of fruit juices. Role of enzymes in baking, meat and meat processing

UNIT II (10 hrs)

Introduction to Genetics, Mendelian genetics, Population & Evolutionary genetics, Gene Mapping. Microbial gene transfer mechanisms, Mutation, Types of mutations, Molecular mechanism of mutations, practical applications. Biological role of DNA in cell metabolism, Molecular genetics i.e. fundamentals of molecular biology with special reference to chemistry and biology and DNA, (Primary secondary and tertiary) structures., DNA repair Mechanisms, Recombinant DNA Technology

UNIT III (10 hrs)

GMO, genetic recombination mechanisms and technique used for improvement in microbial strains, Recombinant-DNA technology (plasmids and cloning), Expression of foreign genes, Promoters (Enzyme), Biomass production by using various microorganisms.

UNIT IV (10 hrs)

Applications of genetical control mechanism in industrial fermentation process, (Induction, manipulation and recombination).

UNIT V (10 hrs)

Cell and tissue culture, Micro-propagation, Continuous cultures, Secondary metabolites synthesis.

UNIT VI (10 Hrs)

Ethical issues concerning GM foods; testing for GMOs; current guidelines for the production, release and movement of GMOs; labelling and traceability; trade related aspects; biosafety; risk assessment and risk management. Public perception of GM foods. IPR. GMO Act 2004

References:

1. Bains W. 1993. Biotechnology from A to Z. Oxford Univ. Press.
2. Joshi VK & Pandey A. 1999. Biotechnology: Food Fermentation. Vols. I, II. Education Publ.
3. Knorr D. 1982. Food Biotechnology. Marcel Dekker.
4. Lee BH. 1996. Fundamentals of Food Biotechnology. VCH.
5. Perlman D. 1977-1979. Annual Reports of Fermentation Processes.
6. Prescott SC & Dunn CG. 1959. Industrial Microbiology. McGraw Hill.
7. Ward OP. 1989. Fermentation Biotechnology. Prentice Hall.

SDC5FP20 FOOD TOXICOLOGY (2 CREDITS)

Objectives

- To acquire knowledge about the injurious effects on living systems of chemicals present in foods through various ways.
- To familiar with the basic chemical and biological aspects of toxins during processing.
- To develop an understanding of the chemical and biological principles that determine toxicity.

Learning Outcomes

- The Awareness on the concept “food processing as a toxin generator”.
- Familiar with their properties, modes of action of toxins.

Unit I (5 hrs)

Definition scope and general principles of food toxicology; manifestation of toxic effects; classification of food toxicants; factors affecting toxicity of compounds; methods used in safety evaluation-risk assessments.

Unit II (5 hrs)

Toxicants and allergens in foods derived from plants, animals, marine, algae & mushroom; Microbial toxins; Food Poisoning; Food borne infections and disease.

Unit III (10 hrs)

Derived Food toxicants- Processing & Packaging; Toxicants generated during food processing such as nitrosamines, acrylamide, benzene, dioxins and furans; persistent organic pollutants.

Unit IV (10 hrs)

Toxicology & food additives; Toxicological aspects of nutrient supplements; Chemicals from processing such as fumigants, chlorinated solvents, autoxidation products, carcinogens in smoked foods and pyrolysis, agrochemicals; heavy metals; intentional and unintentional additives.

References

1. Branen AL, Davidson PM & Salminen S. 1990. Food Additives. Marcel Dekker.
2. Concon JM. 1988. Food Toxicology - Principles & Concepts. Marcel Dekker.
3. Hathcock JN. (Ed.). 1982. Nutritional Toxicology. Vol. I. Academic Press.
4. Rechcigl M Jr. 1983. (Ed.). Handbook of Naturally Occurring Food Toxicants. CRC Press.
5. Shabbir S. 2007. Food Borne Diseases. Humana Press.
6. Steven T. 1989. Food Toxicology: A Perspective on Relative Risks.
7. Tweedy BG. 1991. Pesticide Residues and Food Safety. Royal Society of Chemistry.

SDC5FP21 INSTRUMENTAL FOOD ANALYSIS & TECHNIQUES (4 CREDITS)

Objectives

- To enhance the basic concepts of food analysis
- To know importance and properties of different techniques of food analysis.
- To provide knowledge on the principles and working of Instruments for food analysis

Learning Outcomes

- Exposure to various Instrumental analysis of foods which needed for statutory requirements
- Understand the relevance of each technique in the various types of food.
- Knowledge of operation and analysis through sophisticated instruments in the field of food processing to develop a better food analyst.

Unit I (5 hrs)

Sampling techniques; Water activity, its measurements and significance in food quality; Calibration and standardization of different instruments.

Unit II (15 hrs)

Spectroscopic techniques using UV/Vis, fluorescence, IR, FTIR, NIR,NMR, atomic absorption, ICP, polarimetry, refractometry, microscopic techniques in food analysis (light microscopy, SEM, TEM, XRD, particle size analysis, image analysis etc.).

Unit III (20 hrs)

Chromatographic techniques: Adsorption, column, partition, affinity, ion exchange, size exclusion, GC, HPLC, GCMS, LCMS.

Unit IV (10 hrs)

Separation techniques: Gel filtration, dialysis, electrophoresis, sedimentation, ultrafiltration and ultracentrifugation, solid phase extraction, supercritical fluid extraction, isoelectric focusing, isotopic techniques, manometric techniques.

Unit V (10 hrs)

Special techniques: Immunoassay techniques; Isotopic, non-isotopic and enzyme immunoassays; surface tension; enzymatic methods of food analysis; thermal methods in food analysis.

References:

1. AOAC International. 2003. Official methods of analysis of AOAC International. 17th Ed. Gaithersburg, MD, USA, Association of Analytical Communities.
2. Kirk RS & Sawyer R. 1991. Pearson's Chemical Analysis of Foods. 9th Ed. Longman Scientific & Technical.
3. Leo ML. 2004. Handbook of Food Analysis. 2nd Ed. Vols. I-III. Linden G. 1996. Analytical Techniques for Foods and Agricultural Products. VCH.
4. Macleod AJ. 1973. Instrumental Methods of Food Analysis. Elek Sci. Marcel Dekker.
5. Nielsen S. (Eds.). 1994. Introduction to Chemical Analysis of Foods. Jones & Bartlett.
6. Pomrenz Y & Meloan CE. 1996. Food Analysis - Theory and Practice. 3rd Ed. CBS.

7. Ranganna S. 2001. Handbook of Analysis and Quality Control for Fruit and Vegetable Products. 2nd Ed. Tata-McGraw-Hill.
8. Robinson JW. 1970. Undergraduate Instrumental Analysis. Marcel Dekker.

SDC5FP22 FOOD SAFETY REGULATION & STANDARDS (5 CREDITS)

Objectives

- To enhance the basic concepts of food safety and quality management systems
- To aware about the various international laws and regulations
- To provide knowledge on the importance of food safety in food industries.

Learning Outcomes

- Exposure to various food safety management systems in the current scenario of food industries.
- Exposure on the various laws and regulations for self-establishment of the new food start-up
- Become an expertise food technologist in the area of an quality department of an food industry

Unit I (10 hrs)

Codex Alimentarius Commission (CODEX): Introduction, standards, codex of practice, guidelines and recommendations, applying codex standards, Codex India, core functions of National Codex Contact Point, National Codex Committee of India

Unit II (10 hrs)

International Organization of Standardization (ISO): Overview, structure, interpretation and case studies of food safety and Quality management including ISO-22000, ISO-9001:2000, ISO22000:2005, ISO 17025/CODES/GLP, Retailers standards: BRC food and BRC IOP standards, IFS, SQF: 1000, SQF: 2000.

Unit III (10 hrs)

Hazard Analysis Critical Control Point (HACCP): History, structure, pre- requites and Principles, HACCP applications, HACCP based SOPs.

Unit IV (15 hrs)

Good Manufacturing Practices (GMP), Good Hygienic Practices (GHP), Good Agricultural Practice(GAP), Good Veterinary Practice (GVP),Storage and distribution of food, sanitation and safety in food services.

Unit V (10 hrs)

Evolution in Food laws and regulations- Essential commodity Act,PFA, FPO,etc.,. Other Food Regulations and Standards- FDA, AGMARK, BIS ,

Unit VI (20 hrs)

FSSA, 2006: Salient features of food safety and standards Act, 2006, licensing and registration. Food safety standards of packaging and labelling regulations, 2011, safety standards of food product standards and food additives regulations 2011, safety standards of licensing and registration of food Business regulations,2011, Food safety standards of prohibition and restriction sales regulations 2011, Food safety and standards of contaminants, toxins and residues regulation 2011-,. Food safety standards of laboratory and sample analysis, 2011

References

1. Pelczar, M.I., and Reid, R.D. (2009) Microbiology, 5th Ed., McGraw Hill Inc., New York.
2. Adams, M.R., and Moss, M.G., (2005) Food Microbiology, 1st Ed., New Age International (P) Ltd., New Delhi.
3. Frazier, W.C. (2008) Food Microbiology, 4th Ed., McGraw Hill Inc., New York.
4. The training manual for Food Safety Regulators. Vol.II- Food Safety regulations and food safety management. (2011) Food safety and Standards Authority of India. New Delhi
5. Surak, J.G., and Wilson, S. (2007) American Society for Quality, 2nd Ed., Quality Press
6. Gazette of Food Safety and Standards Act, (2006) Food Safety regulations and food safety management. Food Safety and Standards Authority of India. New Delhi .

SDC5FP23 FOOD SUPPLY CHAIN & MARKETING MANAGEMENT (5 CREDITS)

OBJECTIVE:

- To understand to the new concept of a food supply chain or food system.
- To understand the factors involved in the movement of food and Money through the supply chains through an in- class activity

Learning Outcome

- Familiarize the new concepts of supply chain and special focus on the food supply chain system.
- To get knowledge food safety and quality is legally regulated during the distribution in the supply chain
- To initiate the marketing management skills of students through various medium of marketing.
- Students will acquire knowledge on to market the food products.

Unit I (15 hrs)

Concept of supply chain-Definition of Supply Chain Management- Supply Chain Management as a Management Philosophy- Growth of Supply chain, Function of SCM Strategic decision in supply chain- Value chain for Supply Chain Management

Unit II (15 hrs)

Customer focus in Supply Chain Management, Buyers Perspective, Suppliers Perspective, Stages of Development in Supplier Relations. Supply Chain Strategies – (i) Cycle View (ii) Push & Pull View. Achievement of strategic fit through different steps, Obstacles to achieving Strategic Fit.

Unit III (15 hrs)

Concept and functions of marketing; concepts and scope of marketing management; concepts and elements of marketing mix, Environmental analysis customer relationship marketing. Consumer behaviour; consumerism-consumer segmentation-Targeting-positioning; Marketing opportunities Analysis & marketing research

Unit IV (15 hrs)

Market measurement- present and future demand; Market forecasting; Marketing Planning Process, Product policy and planning: Product-mix; product line; product life cycle, New product development process. Product brand, packaging, services pricing decisions, Marketing channel decisions, Retailing, wholesaling and distribution, Advertising, Personal Selling, Publicity; Sales Promotion

V (15 hrs)

Food Supply chain-relevance of food supply chain in Food marketing, storage and cold storage –food logistics-Food Packing

References

1. Supply Chain Management – Sunil Chapra & Peter Meindl, PHI
2. Essentials of Supply Chain Management – Dr. R.P. Mohanty & Dr. S.G. Deshmukh, Jaico publishing House
3. Designing & Managing The Supply Chain David Simchi-Levi , Philip Kamiusky, Edith Simchi-L
4. Chhabra TN & Suria RK. 2001. *Management Process and Perspectives*. Kitab Mahal.
5. Jhingan ML. 2005. *International Economics*. 5th Ed. Virnda Publ.
6. Kotler P. 2000. *Marketing Management*. Prentice Hall.
7. Reddy SS, Ram PR, Sastry TVN & Bhavani ID. 2004. *Agricultural Economics*. Oxford & IBH.

SDC5FP24 FOOD QUALITY MANAGEMENT & AUDITING (5 CREDITS)

Objectives

- To provide a basic understanding of quality concepts and practices
- To obtain information regarding standards and specifications
- To get details on export import policies and certifications
- To identify inspection procedures and requirements

Learning outcome

- Understand principles and methods of quality management
- Exposure on HACCP in different food processing
- Identifying hazards and critical control points
- A clear idea about standards and specifications
- Recognizing special establishment inspection in different processing units

Unit I (10 hrs)

Concepts of quality management: Quality management systems in India; Various organizations dealing with inspection, traceability and authentication, certification and quality assurance; labeling issues.

Unit II (15 hrs)

Quality assurance, Total Quality Management; Quality manuals, documentation and audits; Indian & International quality systems and standards like ISO and Food Codex; Export import policy, export documentation; Laboratory quality procedures and assessment of laboratory performance; Applications in different food industries; IPR and Patent.

Unit III (15 hrs)

Food surveillance: International and national practices, procedure and protocols, food alerts, traceability and food product recall. Risk analysis: risk assessment, management and communication. Food standards and Specification: need for auditing, increasing importance of HACCP based Codex Standards (GATT).

Unit IV (15 hrs)

Export and import of food in India: Introduction, import and export policies, FDA import policy, export-import policy, export control systems. Import intelligence and alert systems, packaging and labeling, specifications and certifications. Case studies and judicial pronouncements, procedure for investigations and filing of cases by food safety regulator as per FSS act.

Unit V (10 hrs)

Inspection of food establishments, manufacturing units: Food regulatory enforcement and compliance through inspection. Inspectional requirements for food business operators: general inspection procedures, biological inspection of establishments.

Unit VI (10 hrs)

Special establishment inspection: Processing of fruits and vegetables, bakery products, milk and milk products, meat and meat products, fish and fish products and chocolate and cocoa. Candy and chocolate processing units, fats and oil processing units, frozen food establishments, food canning plants, beverage industry, retail meat shops, food ware houses and food service distribution

References

1. Amerine MA, Pangborn RM & Rosslos EB. 1965. Principles of Sensory Evaluation of Food. Academic Press.
2. Early R. 1995. Guide to Quality Management Systems for Food Industries. Blackie Academic.
3. Furia TE. 1980. Regulatory status of Direct Food Additives. CRC Press.
4. Jellinek G. 1985. Sensory Evaluation of Food - Theory and Practice. Ellis Horwood.
5. Krammer A & Twigg BA. 1973. Quality Control in Food Industry. Vol. I, II. AVI Publ.
6. Macrae R, Roloson R & Sadlu MJ. 1994. Encyclopedia of Food Science & Technology & Nutrition. Vol. XVI. Academic Press.
7. Piggot J.R. 1984. Sensory Evaluation of Foods. Elbview Applied Science.
8. Ranganna S. 2001. Handbook of Analysis and Quality Control for Fruit
9. The training manual for Food Safety Regulators. (2011) Vol. III, Food Safety regulations and food safety management. Food Safety and Standards Authority of India. New Delhi.
10. Foreign Trade Policy (27th August 2009 to 31st March 2014), Department of Commerce, Ministry of Commerce and Industry, Government of India

SDC5FP25 (P) ANALYSIS OF FOODS (5 CREDITS)

Objectives

- To provide practical awareness
- To be able to use laboratory techniques
- To evaluate the composition of various food samples
- To detect various food colors

Learning outcomes

- Understanding food chemistry principles
- Finding out the composition of food samples
- Acquiring overall concept of various foods
- Identification of food colors
- Developing laboratory skills

Experiments

- Determination of reducing sugar, total reducing sugar in honey/ jaggery / sugar (Lane & Eynone Method).
- Determination of Fructose: glucose ratio in honey (Iodimetry).
- Determination of Gum Base Content in Bubble gum/ chewing gum/ Cocoa butter (soxhlet extraction method)
- Detection and identification of synthetic food colours (Paper chromatographic method/ TLC)
- Determination of Fat content in cocoa butter
- Determination of acidity of extracted fat in cashewnuts / biscuits (Soxhlet extraction method)
- Estimation of crude fibre in fruits
- Estimation of starch content in vegetables
- Estimation of Protein (Colorimetric method) content in food
- Estimation of invert sugar in Jaggery / Honey
- Test for chicory in coffee
- Determination of Peroxidase enzyme
- Rehydration ratio of dried foods

References

1. Ranganna S 2001. Hand book of analysis and quality control of fruits and vegetable products Tata- McGraw- Hill. .
2. Nielson S 1994 Introduction to Chemical Analysis of Foods Jones & Bartlett
3. Pomrenz Y& Meloan CE 1996 Food Analysis Theory and Practice CBS
4. Food Safety Standard authority of India site manual

SEMESTER IV

Course code	Title of course	Hours per week	No. of credits	Total credits
SDC6FP26Pr	Internship, Project Work & Term paper	900	30	30

Model Question Paper

SDC1FP 01 INTRODUCTION TO FOOD SCIENCE&TECHNOLOGY (5 credits)

Time 2.5 Hours

Maximum mark: 80

Section A (Short answers)

Each question carries 2 marks. (Max. 25 marks)

1. Define Food additives.
2. What is mean by probiotics?
3. Give two examples for monosacharides.
4. Name any two Anti-Oxidants?
5. Expand IICPT and DFRL.
6. Name major nutrients present in our diet.
7. What are amino-acids? , give examples.
8. Name major spices.
9. Give any two food journals.
10. What do you mean by leavening agents?
11. Write the importance of Milk in human nutrition.
12. What are stabilizers?
13. Give any two food journals
14. Name any anti-oxidants.
15. What are amino acids?

Section B (Paragraph)

Each Carry 5 marks (Max.35 Marks)

16. Name four functions of water in foods
17. Differentiate between artificial and natural colours
18. Define "Functional Foods"
19. Write the functions of fat in foods
20. Which are the anti-nutritional factors present in pulses?
21. Discuss in detail about CFTRI and DFRL.
22. Write about sensory analysis of food.
23. Make a note on list of major Food industries in India

Section C

Answer any two of the following (Essay) (2×10 = 20)

24. Discuss in details about various nutrients present in foods.
25. Write in detail about food additives.
26. Differentiate between nutraceuticals and phytochemicals
27. What are vitamins? How they are important in diet?

SDC1FP02 FOOD CHEMISTRY (5 credits)

Time: 2.5 Hours

Maximum mark: 80

Section A (Short answers)

Each question carries 2 marks. (Max. 25 marks)

1. What is emulsion?
2. Name two method of estimating protein in food material
3. What are enzymes?
4. What is enzymatic browning
5. What is gelatinization?
6. Write down the changes involved in gelatinization of starch.
7. How are proteins classified?
8. What is the role of pigments?
9. Name four polysaccharides
10. Draw the structure of glucose
11. Name any two antioxidants
12. Give the constituents of lactose
13. What are essential amino acids? Give any two examples.
14. Name two methods for moisture determination
15. Write any two function of Fat

Section B (Paragraph)

Each Carry 5 marks (Max.35 Marks)

16. Write a note on starch
17. Explain about emulsifying agents
18. Explain Hydrogenation
19. Non-Enzymatic browning reaction
20. Discuss about colloids
21. Explain Kjeldahl's Methods for estimation of Protein.
22. Classify fatty acids. Give examples.
23. Write about the properties of water

Section C (Essay)

Answer any two of the following (2x10 = 20 Marks)

24. Explain in detail about carbohydrates with its classification and examples
25. What are enzymes? How enzymes are classified? What are the uses of enzymes in food industry?
26. Why amino acids play an important role in in our diet? Explain the structure of protein in detail.
27. Discuss the importance of lipids. Also write about rancidity and its types in detail

SDC1FP03 FOOD MICROBIOLOGY (5 CREDITS)

Time 2¹/₂ Hours

Maximum mark: 80

SECTION-A

Each carry 2 marks (Max.25 Marks)

1. Write note on Germ theory of diseases?
2. Enlist Koch's Postulates?
3. What are the phases of bacterial growth curve?
4. Give the function of capsule?
5. Differentiate Phototrophs and Chemotrophs?
6. Write a short notes on eyepiece, condenser and light source in microscopy?
7. Which is the most method of reproduction in bacteria?
8. Difference between hyphae and mycelium?
9. What are viruses composed of?
10. Comment on selective and differential media?
11. How can we control the microorganisms?
12. Differentiate intoxication and infection?
13. Differentiate coccus and bacillus?
14. Write a note on bacteriophage?
15. What is the importance of culture media?

SECTION-B

Each Carry 5 marks (Max.35 Marks)

16. Write the name of the organism and the production process involved in the formation of Sauer Kraut and soy sauce through a flow chart?
17. Explain Food infections and Food Intoxications with examples. Describe Shigellosis with the help of following headings. Causative Agent, Natural source, Transmission Pathogenesis & Treatment?
18. Discuss Spontaneous generation theory?
19. Explain the structure & chemical composition of Gram +ve/ Gram-ve cell wall?
20. Differentiate dark and bright field microscope?
21. Explain pure culture techniques?
22. Give general characters of Virus?
23. Briefly explain bacteriophage?

SECTION-C
(2X10=20 Marks)

24. Explain about the reproduction in bacteria?
25. Microbiological testing of water and milk?
26. Explain morphology and replication of virus?
27. What is the role of bacteria in human life? How we can control these micro organis

**SDC1FP04 CEREALS, PULSES, OILSEEDS AND CONFECTIONERY TECHNOLOGY
(5Credits)**

Time: 2.5 Hours

Maximum mark: 80

**Section A (Short answers)
Each question carry 2 marks (Max.25 marks)**

1. What is curing of rice?
2. Define aging of rice.
3. What are the role of ingredients in cake making?
4. Differentiate between cookies and biscuits.
5. What are the factors affecting cooking time of pulses?
6. Define hard candy.
7. What is staling of bread?
8. What is puffed rice?
9. Define sprouting of pulses.
10. Define flaked rice.
11. What are the principles of baking?
12. Define millets.
13. Define toffee.
14. Define caramel.
15. What are the types of cake making?

**Section B (Paragraph)
Each question carry 5 marks (Max.35 marks)**

16. Write a short note on classification of baked foods.
17. Discuss the advantages and disadvantages of parboiling of rice.
18. Briefly explain faults and remedies in cake making.
19. Differentiate between crackers and wafers in detail.
20. Explain anti nutritional factors in pulses.
21. Explain pulse processing.
22. Write a short note on by products of rice milling.
23. Explain the technology of biscuits.

**Section C (Essay)
Answer any two of the following (2x10= 20 Marks)**

24. Explain the methods of parboiling of rice.
25. Write elaborately on milling of oats and barley.
26. Describe milling of wheat and its by-products.
27. Explain the modern machineries in rice milling

**SDC2FP05 TECHNOLOGY OF FRUITS, VEGETABLES PRODUCTS AND POSTHARVEST
MANAGEMENT (5credits)**

Time 2.5Hours

Maximum Marks 80

PART A

Each carry 2 marks (Max.25 Marks)

1. What is IQF?
2. What is chilling injury?
3. Write the specification tomato sauce
4. Define maturity index of fruits
5. What is controlled atmospheric storage?
6. Write the types of browning with example
7. What is blanching?
8. What is the function of salt in pickling?
9. Differentiate between squash and cordials.
10. What are the factors affecting gel formation
11. How is browning prevented?
12. Write about the composition of fruits?
13. What are the changes occurring during ripening?
14. What is mean by climacteric fruits?
15. What is syneresis of jam?

PART B

Each Carry 5marks (Max.35]

16. Write the post harvest physiological changes in fruits and vegetables
17. Describe the process of fruit cordial
18. Differentiate freeze drying and tunnel drying.
19. What are pectic enzymes? Discuss their importance in ripening of fruits.
20. What are the commodity pre treatment usually applying
21. Which are the different methods of peeling?
22. Explain various primary processing steps in detail.
23. Differentiate glazed fruit and candied fruit

PART C

Answer any two of the following (2x10 = 20 Marks)

24. Explain the dehydration of fruits and vegetables using various drying methods
25. With the help of neat flow chart explain the processing of tomato ketchup and write the defects associated with the product.
26. What are the steps involved in canning of fruits.
27. Steps involved in manufacture of Jams. Discuss defects in Jam preparation.

A11 BASIC NUMERICAL SKILLS

Time: 2.5 Hours

Maximum mark: 80

Each question carries 2 marks (Maximum 25 marks)

1. What is an index number?

2. Find the sum of n terms of an A.P. whose 7th term is 30 and 13th term is 54?
3. What is a power set?
4. Find the value of x in the equation $2x + \frac{5}{x} = 7$
5. Find the value of the determinant

1	2	-3	
2	-1	2	
3	2	4	
6. Solve the equation $x^2 - 4x + 3 = 0$ using completing the square method.
7. Differentiate between discrete and continuous frequency distributions?
8. Solve $2x^2 + 8x + 8 = 0$ by using quadratic formula
9. State Demorgan's law.
10. Find the median for the following values
4,45,60,20,83,19,26,11,27,12,52
11. Explain Kurtosis.
12. What is analysis of time series
13. What is a pie diagram
14. What do you understand by classification of data
15. Represent the following frequency table by histogram

Marks :	10-15	15-20	20-25	25-30	30-35
Number of students :	5	20	50	40	10

Section B (Paragraph)

Each question carries 5 marks (Maximum 35 marks)

16. What are the different aspects to be considered in planning a statistical enquiry?
17. Solve the equation $x + \sqrt{x} = \frac{6}{25}$
17. If $A = \{1,2,3\}$ $B = \{a, b\}$. Find $A \times B$ and $B \times A$. Are they equal ?

18. Find the adjoint of the matrix

$$\begin{pmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{pmatrix}$$



19. Give 3 yearly moving averages for the following series

year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Production (lakh tons)	17.2	17.3	17.7	18.9	19.2	19.3	18.1	20.2	25.3	24.9

20. Find the sum of 20 terms of the series 3,5, 7,9,.....

21. If the fifth and the tenth terms of a G.P are 32 and 1024 respectively, find the first term and the common ratio

22. Find the mean deviation from mean for the following values 25,63,85,75,62, 70,83,28,30,12

Section C (Essay)

Answer any two questions (2 x 10=20)

23. Solve the following by matrix method.

$$\begin{aligned} 2x + 3y + 3z &= 5 \\ x - 2y + z &= -4 \\ 3x - y - 2z &= 3 \end{aligned}$$

24. Discuss the scope, utility and limitation of statistics.

25. Find the sum of n terms of the series 7 + 77 + 777 + 7777 +

26. a) what are the methods used for measuring seasonal variations.

b). Assuming that the trend is absent, determine if there is any seasonality in the data given below. What are the seasonal indices for various quarters?

Year	1 st quarter	2 nd quarter	3 rd quarter	4 th quarter
2010	3.7	4.1	3.3	3.5
2011	3.7	3.9	3.6	3.6
2012	4.0	4.1	3.3	3.1
2013	3.3	4.4	4.0	4.0

A12 INFORMATICS AND EMERGING TECHNOLOGIES

Time: 2.5 Hours

Maximum mark: 80

Section A (Short answers)

Each question carries 2 mark (Maximum 25 Marks)

1. What is an operating system?
2. What is VDU?
3. What are optical fibers?
4. Write two application of holography?
5. Write the issues in online banking security?
6. What is LAN stands for?
7. Write note on finger printing?
8. How is online signature verification done?
9. Distinguish between SMS and MMS?
10. What are storage devices?
11. What is mean by GSM?
12. What is email spam?
13. What is CIA triad?
14. What is e-commerce?
15. Write the uses of optical fibers?

Section B (Paragraph)

Each question carries 5 marks(Maximum 35 marks)

16. What are the various classification of lasers ?
17. Write a note on evolution of mobile telephone technology?
18. What are the different wireless information technologies?
19. Write a note on issues related to social networking?
20. What are functions of cybercrime cell?
21. Write on the application of smart phone.
22. Write note on smart card based authentication
23. Write note on retina identification procedure

Section C (Essay)

Answer any 2. Each question carries 10 marks ((2 x 10=20)

24. Explain the applications of laser in various fields?

25. Explain the different biometric **method** currently used?

26. Write note on Indian IT Act, 2008

27. Write about the scientific data bases and useful educational websites.

SDC3FP09 BASIC FOOD QUALITY & SAFETY (4 CREDITS)

Time 2.5 Hours

Total 80 Marks

Section-A Each carry 2 marks (Max.25 Marks)

1. What do you mean by food safety ?
2. Differentiate physical and chemical hazard?
3. Differentiate high risk food and low risk food?
4. Define food adulteration?
5. What do you mean by food additives?
6. Differentiate disinfectants and Sanitizer?
7. List any four physical hazards?
8. What do you mean by sensory evaluation?
9. Name any one adulterant used in milk and its detection method?
10. Write about cleaning compound
11. What do you mean by PFA?
12. Why food regulations introduced?
13. List various food adulterants
14. Define quality assurance
15. What are safety rules for handling waste?

Section B (Paragraph)

Each Carry 5 marks (Max.35 Marks)

16. Write a note on GMP and GHP?
17. Write the importance of food safety?
18. Write about food sanitation and cleaning compounds?
19. Discuss various quality attributes of food
20. Explain intrinsic and extrinsic factors affecting the growth of micro organism
21. What are the sources of contamination?
22. Write about milk and milk product amendment regulation
23. Discuss importance and significance of microorganisms in food safety.

Section C (Essay)

Answer any two of the following (2x10 = 20 Marks)

24. Explain in detail about the history of various food regulations in India
25. Write in detail about food adulteration and their detection
26. With respect to sanitary procedures, explain the guidelines to be followed while food preparation.
27. Describe the different types of tests used for sensory evaluation of food products

SDC3FP10 BUSINESS MANAGEMENT (5 credit)

Time: 2.5 Hours

Maximum mark: 80

Section A (Short answers)

Each question carry 2 marks (Max.25 marks)

1. Define concept of management.
2. What are the characteristics of management.
3. What is ethics?
4. What is fish bone diagram?
5. What is communication?
6. What are the functions of management?
7. Describe the types of ethics.
8. Expand and define TQM.
9. What are the advantages of business ethics?
10. Define management by motivation.
11. What are the barriers to effective planning?
12. Define TPM.
13. Define stress management.
14. What is MIS?

Section B (Paragraph)

Each question carry 5 marks (Max.35 marks)

15. Explain management by participation.
16. What are the contributions of McGregor in management?
17. What are the corporate social responsibility?
18. What are the ethics in advertising?
19. Explain Kaizen methodology.
20. What is ISO and its functions?
21. Explain logistics management.
22. What are the contributions of Maslow and Herzberg?
23. What are the concepts of leadership and its traits?

Section C (Essay)

Answer any two of the following (2x10= 20 Marks)

24. What are the environment issues in business management?
25. What are the importance of ethics in current business?
26. What are the emerging concepts in business management?
27. Elaborate departmentation and delegation.

SDC3FP11 FOOD PRESERVATION TECHNOLOGY (4 CREDITS)

Time: 2.5 Hours

Maximum mark: 80

Section A (Short answers)

Each question carries 2 marks. (Max. 25 marks)

1. What is blanching?
2. Define pasteurization?
3. Write a short note on types of drying and its significance?
4. What you mean by freezing rate?
5. What is chilling injury?
6. Dose and Dosimetry in irradiation?
7. What are the industrial uses of fermentation?
8. What are natural preservatives? Give an example?
9. What are the disadvantages of chemical preservation?
10. What is the role of Refrigeration in food preservation?
11. What is UHT process?
12. Comment on spray drying?
13. Differentiate quick and slow freezing?
14. Write on Retrogradation?
15. Give an example for acetic acid fermentation?

Section B (Paragraph)

Each Carry 5 marks (Max.35 Marks)

16. Define fluidized bed and cryogenic freezer?
17. Discuss with line diagram the principal and Process involved of dehydration of food using
(i) Spray Drier,(ii) Drum Drier,(iii) Fluidized bed Drier
18. What are the commonly used natural preservatives?
19. Differentiate ohmic heating and microwave heating?
20. What you mean by fermentation? Write about types of fermentation?
21. What are the steps in new product development?
22. Describe the effects of radiation on food quality?
23. Write detailed notes on the scope and benefit of industrial food preservation?

Section C (Essay)

Answer any two of the following (2x10 = 20 Marks)

24. Explain the use of high temperatures for food preservation and list out the factors affecting the heat resistance of microorganisms?
25. Explain the preservation by using natural and chemical preservatives?
26. Brief about the recent methods in preservation with examples?
27. Explain about freezing and types of freezer?

SDC3FP12 FOOD PACKAGING TECHNOLOGY (4 credit)

Time: 2.5 Hours

Maximum mark: 80

Section A (Short answers)

Each question carries 2 marks (Max.25 marks)

1. Describe the functions of packaging.
2. What are the functions of consumer packaging.
3. Describe the functions of distributive packaging.
4. Define dry bonding lamination.
5. Describe the gases used in food packaging.
6. Describe cellophanes.
7. Define LDPE
8. Define PP
9. Define extrusion lamination
10. Define polyamides.
11. What is wet bonding lamination.
12. What are the advantages of retort pouches?
13. Write the equation for WVTR.
14. What is GSM?
15. Write the equation for Gas transmission rate.

Section B (Paragraph)

Each question carry 5 marks (Max.35 marks)

16. Elaborate nutritional labeling.
17. Explain classification of packaging.
18. Explain vacuum packaging.
19. Differentiate between water vapour transmission rate and Gas transmission rate.
20. Write short note on edible film packaging.
21. Describe boxes, jars, bottles and cans.
22. Describe the manufacturing of paper and paperboard
23. Describe form-fill-seal.

Section C (Essay)

Answer any two of the following (2x10= 20 Marks)

24. Differentiate between CAP and MAP.
25. Elaborate Standard Weights and Measurement Act.
26. Explain the packaging commodity regulatory order for food commodities.
27. Explain the manufacturing of glass containers.

SDC3FP13 DAIRY TECHNOLOGY (5 CRDITS)

Time: 2.5 Hours

Maximum mark: 80

Section A (Short answers)

Each question carries 2 marks. (Max. 25 marks)

1. What is the difference between 'Toned milk' and 'double toned milk'?
2. What are milk proteins? Give examples.
3. Enlist different major constituents of milk?
4. Write short note on Composition of milk?
5. Define hard cheese give an example?
6. What are the different types of yoghurt?
7. Define Probiotics?
8. Which vitamin is present and deficient in milk?
9. What are major ingredients found in ice cream?
10. Differentiate cottage and cheddar cheese?
11. Enlist whole and skim milk?
12. Classification of butter?
13. Role of milk SNF in ice cream?
14. Different layers of tetrapak carton
15. Skimmed milk

Section B (Paragraph)

Each Carry 5 marks (Max.35 Marks)

16. Write down the composition of butter?
17. Define milk. Write detailed note on various milk enzymes along with their specific actions. Also discuss the enzymatic and acid coagulation of milk?
18. Processing of milk
19. Write down the preparation of acidophilus milk with flow chart?
20. What are the factors affecting composition of milk?
21. Write on kefir and koumiss
22. Write a note on instant milk powder
23. Why cleaning and sanitation of milk plant is important?

Section C (Essay)

Answer any two of the following (2x10 = 20 Marks)

24. Write about Composition of milk from various sources, factors affecting Composition of milk.
25. What are the types of milk?
26. Write briefly on cheese and yoghurt production?
27. Processing technology of cream and butter?

A13 ENTREPRENEURSHIP AND ENVIRONMENTAL SCIENCE

Time: 2.5 Hours

Maximum mark: 80

Section A (Short answers)

Each question carries 2 marks. (Max. 25 marks)

1. Who is entrepreneur?
2. Define Intrapreneur?
3. Expand the organization name KINFRA
4. What is an equity share?
5. Which unit is considered as ancillary units?
6. What is plant layout?
7. Give two differences between pollution control and prevention
8. What are the barriers to sustainability?
9. What is environmental sustainability?
10. What is air pollution? Give examples for air pollutants
11. What is air quality index?
12. What is bioaccumulation?
13. What is eutrophication?
14. What is the principal of water treatment?
15. What is portable water standard

Section B (Paragraph)

Each Carry 5 marks (Max.35 Marks)

16. Write shortly the role of KINFRA in Entrepreneur development in kerala
17. What is the requirement of technical assistance for a business enterprise?
18. Explain the concept of marketing assistance in shortly
19. What are the indicators of sustainability?
20. Write a short note on need of effluent treatment
21. Discuss the methods to measure noise pollution
22. What are absorbers and how it control particulate emission?
23. Write a note on the environmental implications for industries

Section C (Essay)

Answer any two of the following

(2x10 = 20 Marks)

24. Write elaborately starting of MSME
25. What are the methods to control particulate emissions?
26. Describe the impact of industrialization on sustainable development.
27. Explain air pollution control measures in detail.

A14 NUTRITION AND HEALTH

Time: 2.5 Hours

Maximum mark: 80

Section A (Short answers)

Each question carries 2 marks. (Max. 25 marks)

1. What is kwashiorkor?
2. How minerals are classified?
3. What is mal nutrition?
4. What is mean by nutrients?
5. What is spiritual health?
6. Name the food groups
7. The linkage between two amino acids in a protein
8. What is water balance?
9. What is goitre?
10. Essential Amino acids
11. What is the Energy value of carbohydrate and fats
12. Define Protein Efficiency Ratio.
13. Point out the importance of water
14. What is saturated fatty acids and Give one example.
15. Name any four macro minerals

Section B (Paragraph)

Each Carry 5 marks (Max.35 Marks)

16. Classify lipids and give examples for each
17. How we can measure calorific value of Foods?
18. How protein quality will calculate?
19. Write about fat soluble vitamins
20. Write the functions of fats and the digestion process
21. Write a short note on BMR?
22. Write a note on dietary fibre
23. What is the relation of good nutrition to physical development and health?

Section C (Essay)

Answer any two of the following (2x10 = 20 Marks)

24. Write the mechanism of digestion and absorption of carbohydrates in the body by mentioning role of each enzyme
25. Differentiate between specific dynamic action and BMR. Also write the factors affecting them
26. How minerals are classified. Explain in detail the role of any two minerals in human nutrition
27. Explain in detail the role of water soluble vitamins in the human system. Give any four deficiency diseases.

SDC4 FP14 SPICES AND PLANTATION PRODUCTS TECHNOLOGY (5 credit)

Time: 2.5 Hours

Maximum mark: 80

Section A (Short answers)

Each question carries 2 marks (Max.25 marks)

1. Define chicory.
2. Define instant coffee.
3. Define decaffeination.
4. Describe types of tea.
5. Write the solvents used for oleoresin extraction.
6. What are essential oils
7. Define CTC.
8. What is iced tea?
9. Write the chemical composition of turmeric
10. What are oleoresins?
11. What are the use of spices?
12. What are the chemical composition of pepper?
13. Define drip coffee.
14. Describe chemistry of chocolate.
15. Define percolated coffee.

Section B (Paragraph)

Each question carry 5 marks (Max.35 marks)

16. Explain the types of tea manufacturing.
17. Describe the quality grading of coffee.
18. Describe the quality control of chocolates.
19. Explain the manufacture of cocoa liquor.
20. Write short note on minor spices.
21. What are the types of chocolates?
22. What are the chemical changes that occur during of roasting of coffee beans?
23. Describe the chemistry of cocoa bean and composition.

Section C (Essay)

Answer any two of the following (2x10= 20 Marks)

24. What are the methods of decaffeination?
25. Explain the major spices and their composition.
26. Describe the process of fumigation in spice industry.
27. Explain the irradiation process of spices.

SDC4FP15 BEVERAGES TECHNOLOGY (4 CREDITS)

Time: 2.5 Hours

Maximum mark: 80

Section A (Short answers)

Each question carries 2 marks. (Max. 25 marks)

1. What are Beverages and how do you classify them?
2. What you mean by fermented beverages?
3. Define Brewing?
4. Give role of stabilizer agents?
5. Difference between white wine and red wine?
6. Role of hops in beer production?
7. Write a short note on flavoured water?
8. What is the role of yeast in beverages?
9. What are the two types of beer?
10. What you mean by synthetic beverages?
11. Role of carbon in carbonated beverages?
12. Define cordial?
13. Use of sodium benzoate in beverages?
14. Differentiate oolong tea and white tea?
15. What you mean by carbonated water?

Section B (Paragraph)

Each Carry 5 marks (Max.35 Marks)

16. State the uses of preservatives in food processing.
17. Write the health benefits of wine.
18. BIS quality standards of bottled water and mineral water
19. Write down the role of various ingredients of soft drinks
20. Role of sports drinks and isotonic beverages?
21. What are the steps followed in the process of tea?
22. FSSA specifications for various fruit juices?
23. What are the equipments used in brewing and distillation process?

Section C (Essay)

Answer any two of the following (2x10 = 20 Marks)

24. Describe the manufacturing process of fruit beverages?
25. Write about the processing of wine? Give classification of wines. Describe fortified and sparkling wine?
26. Describe the manufacturing process of wine?
27. What are speciality beverages? Give 2 examples with processing steps?

SDC4FP16 TECHNOLOGY OF ANIMAL PRODUCTS (5credits)

Time: 2.5hrs

Maximum mark-80

Section A

(Each question carries 2 marks. Maximum 25 marks)

1. Draw the flow chart of the pig processing?
2. What is rigor mortis mean?
3. Differentiate between ham and bacon
4. What are the objectives of smoking
5. What are the functions of casing in sausage
6. What is mean by byproducts of meat industry
7. If you are provided with both fresh and spoiled fish in a market, how could you identify the fresh one
8. What is the effect of heat on egg protein
9. Why lime sealing of egg
10. Why quick freezing is Preferred over slow freezing in fish
11. What is chitosan
12. What is stunning method
13. What is pickling
14. What is album index
15. What is drying in meat industry

PART B

(Each carry 5 marks (maximum 35marks)

16. Differentiate between antemortem and postmortem inspection
17. How sausage can provide a profit to the industry? draw the flow chart of preparation
18. How do you solve blood and bone waste in An industry
19. write the chemical and microbial changes occur in a egg during ageing
20. wright the processing of fish meal
21. Differentiate between fish protein concentrate and fishes ensilage

22. What are the methods is used to determine egg quality

23. What are the advantages of drying in meat products

PART C

Answer any two of the following (2x10=20)

24. what do you think about the importance of meat inspection? what are the postmortem changes occur in meat?

25. How could you classify sausage? also write the processing of sausage?

26. How could you illustrate factors affecting egg quality? also write changes produced during storage in egg in detail

27. What is the significance of the fish oil? Write production of fish body oil and liver oil

SDC4FP17 FOOD ENGINEERING (4 CREDITS)

Time 2.5 Hours

Total 80 Marks

SECTION A (Short answer)

Each question carries 2 marks (Max.25Marks)

1. Define Rheology
2. What is Fouriers Law
3. Differentiate Newtonian and Non-Newtonian fluids
4. Define Apparent viscosity
5. What is constant rate and falling rate period of drying
6. Write an equation for Stephan Boltzmann's law
7. Briefly explain working principle of Spray drier
8. Define Radiation process
9. Differentiate conduction and convection mode of heat transfer
10. Derive an equation for Thermal conductivity
11. Explain Theory of drying
12. Write about Water tube boiler
13. Write briefly about Tubular Heat exchanger
14. Explain Drum drier
15. Define HTST and LTLT

SECTION B (Paragraph)

Each carries 5 marks (Max.35 Marks)

16. What are different types of Boilers? Explain Boiler principle
17. Explain Rheological characteristics of foods and Non-Newtonian fluids
18. Write a brief note on single effect and multiple effect evaporation
19. Briefly explain Drying principle with Drying rate curve
20. Write a brief note on Principles of Freezing and Freezing rate
21. Explain Pasteurizing Equipment's
22. Briefly explain Principle of Refrigeration and Vapor Compression Refrigeration cycle

23. Explain Conduction mode of heat transfer

SECTION C (Essay)

Answer any two of the following questions. (2*10=20marks)

24. Briefly explain various classification of Heat exchangers with neat diagram

25. Write a brief note on three modes of Heat transfer

26. With a neat sketch explain various types of evaporators

27. Write about any four driers with neat diagram

SDC5FP19 FOOD BIOTECHNOLOGY (4 CREDITS)

Time: 2.5 Hours

Maximum mark: 80

Section A (Short answers)

Each question carries 2 marks. (Max. 25 marks)

1. Define Risk Assessment
2. Write a short note on GMO
3. Purpose of micro propagation
4. Why GMO testing is important
5. Difference between cell culture and tissue culture
6. What is the purpose of traceability label?
7. What is microbial strain improvement?
8. Write a short note on continuous culture
9. What is Gene mapping?
10. Difference between the secondary and tertiary structure of DNA
11. What is meant by Recombinant DNA technology?
12. List out the important enzymes used in dairy products
13. Why enzyme technology is important?
14. Advantages of GMO foods
15. What is meant by Mendelian genetics?

Section B (Paragraph)

Each Carry 5 marks (Max.35 Marks)

16. Give a historical overview of food biotechnology
17. Explain the biological role of DNA in cell metabolism
18. Discuss the genetic recombination mechanisms and technique used for improvement in microbial strains
19. Explain secondary metabolites synthesis.
20. Explain Biosafety guidelines in India
21. Write in detail about the testing for detecting GMOs

22. What is mutation and explain the molecular mechanism of mutation

23. Explain the Biomass production by using various microorganisms.

Section C (Essay)

Answer any two of the following

24. Explain in detail about DNA repair Mechanisms

25. Explain the applications of genetical control mechanism in industrial fermentation process

26. Role of enzymes in baking, meat and meat processing

27. Explain GMO act 2004

SDC5FP20 FOOD TOXICOLOGY (2 CREDITS)

TIME 2:HR

MAXIMUM MARKS: 60

SECTION A Each carry 2 marks (max-20marks)

1. What are the chemical factors to the exposure
2. What is risk analysis
3. Discuss about the shellfish poisoning
4. What is foodborne infection
5. What are the chemical effects of fumigants
6. What is food additives
7. What are the effects of persist organic pollutants
8. write the toxic effect of chlorinated solvents
9. Difference between toxicity and toxicology ,toxic substance
10. Toxic substance from packaging
11. Carcinogen in smoked food
12. Factors affecting toxic compounds

SECTION B

Each carry 5 marks (max. 30. Marks)

13. What is microbial toxicity and and explain
14. Toxicology of effects heavy metals
15. What is derived toxins and explain
16. Explain briefly about acrylamide
17. Explain briefly about auto oxidative product
18. General principles of food toxicology
19. Methods used in safety evaluation.

SECTION C (1x10=10 marks)

20. Explain about intentional and unintentional additives in food
21. Explain about algal mushroom, mushroom, marine toxicants

SDC5FP21 INSTRUMENTAL FOOD ANALYSIS AND TECHNIQUES (4 credit)

Time: 2.5 Hours

Maximum mark: 80

Section A (Short answers)

Each question carries 2 marks (Max.25 marks)

1. What is sampling?
2. What is surface tension?
3. What is a permeate?
4. What are the factors depend the rate of Dialysis?
5. What is isotopic immunoassay?
6. Define sedimentation.
7. What is size exclusion in chromatography?
8. What is gel filtration?
9. Define non-isotopic immunoassay.
10. Define ultra centrifugation.
11. Define enzyme immunoassay.
12. Define AAS.
13. Define image analysis.
14. Name the main components of UV-Visible spectrometer.
15. What is photodiode detector in HPLC?

Section B (Paragraph)

Each question carry 5 marks (Max.35 marks)

16. Write an equation for the calculation of water activity.
17. Describe Affinity chromatography.
18. Describe column chromatography.
19. Explain briefly about the Differential Scanning Calorimetry.
20. Explain briefly about LCMS
21. Explain briefly about the steps in sample preparation.
22. Describe ultrafiltration.
23. Describe polarimetry.

Section C (Essay)

Answer any two of the following (2x10= 20 Marks)

24. Explain about the Electron microscopic techniques in food analysis.
25. Explain Super critical fluid extraction and isoelectric focusing.
26. Explain thermal methods in food analysis.
27. Explain calibration and standardisation of different instruments.

SDC5FP22 FOOD SAFETY REGULATION & STANDARDS (5 credits)

Time: 2.5 Hours

Maximum mark: 80

Section A (Short answers)

Each question carries 2 mark (max. 25 marks)

1. What about codex legal tools
2. What are the core functions of national codex contact point
3. How GMP is beneficial to safe food production
4. What are the features of sanitation and safety in food service
5. What are the advantages of a HACCP certification
6. What is HACCP based SOP s mean
7. What is the need of GMP
8. Comment on food storage for safety and quality
9. What is PFA act
10. What is FPO
11. Comment on BIS
12. What is the difference between FSSAI license and registration
13. What is the difference between SQF 1000 and SQF 2000
14. What is BRC in food
15. What is GVP

Section B

Each carry 5 marks (max. 35 marks)

16. Why is national codex contact point is important
17. How could you differentiate ISO 22,000 and ISO 9001 :2000
18. How is pre requisite program is related to HACCP
19. Outline the features of GHP

20. What ideas can you add to the production of safe food? explain features of licensing and food business regulation 2011
21. What do you think about food safety standard of laboratory and sample analysis 2011
22. Silent features of FSSAI 2006
23. Differentiate between AC mark and BIS

Section C

Answer any two of the following (2x10=20)

27. What is meant by Codex Alimentarius? How does the country benefit by participation in Codex? Also explain the structure and organization
28. How HACCP plays a major role in ensuring food safety? Explain the structure and the principle and application in detail
26. Explain about GMP, GHP, GAP in detail
27. Summarize the food regulation and standard bodies like FDA, AGMARK, and BIS

SDC5FP23 FOOD SUPPLY CHAIN & MARKETING MANAGEMENT (5 credits)

Time: 2.5 hrs

maximum- 80 marks

Section A

Each question carry 2 marks (max. Marks 25 marks)

1. What are the different supply chain flows
2. write to aim of push approach to the supply chain management
3. What is cycle view of supply chain strategy
4. What is supplies perspective
5. Define PESTLE analysis
6. Discuss the role of place as an element of marketing mix
7. Write an example for profit maximization in short run and long run
8. Explain the factors to determine the choice of channels of distribution
9. Distinguish between frozen warehousing and cold warehousing in food supply chain
10. write the role of storage in food logistics
11. Write any two objectives of market opportunity analysis
12. Write any two difference between growth and maturity staging product lifecycle
13. What is the difference between retailing and wholesaling
14. What is market forecasting
15. Write down any philosophy of marketing management

SECTION B

Each carry 5 marks (max. 35 marks)

16. The difference between personal selling and sales promotion
17. Write a brief note on growth of supply chain
18. What are the various stages of the development in supplier relation
19. Explain scope of marketing management
20. Define market measurement and forecasting? Describe various market forecasting

techniques

21. Expenditure on advertising is social waste' do you agree discuss?
22. what information is generally placed on package of a food product?design label for one of the food product of your choice.
23. What is the criteria for new Product development process

SECTION C

Answer any two of the following (2x10=20 marks)

24. What is strategic level supply chain management?explain various decision faces in supply chain
25. Explain cycle view and push and pull view of supply chain management strategies
26. What is marketing mixexplain? what its main elements? Explain
27. Define sales promotion explain merits and limitation of sales promotion. What are the used sales promotion activity

SDC5FP24 FOOD QUALITY MANAGEMENT AND AUDITING (5 credit)

Time : 2.5 Hours

Maximum mark: 80

Section A (Short answers)

Each question carry 2 marks. (Max. 25 marks)

1. Define TQM.
2. What are concepts of quality management.
3. Define traceability.
4. What is CAC?
5. Define IPR.
6. What is a patent?
7. Define GLP.
8. Define food quality assurance programmes.
9. What are export documentations?
10. Define certification.
11. Define food surveillance.
12. What is risk analysis?
13. What are the laboratory quality procedures?
14. What are the various organizations dealing with inspection?
15. Define the components of quality assurance.

Section B ((Paragraph)

Each question carry 5 marks (Max.35 marks)

16. Explain the principles of HACCP.
17. Briefly explain the import and export policy.
18. Discuss labeling issues in detail.
19. Explain beverage plant inspection procedure.
20. What are documentation and quality audits?
21. Discuss the inspection procedures for retail meat shop.
22. Explain food ware house inspection.
23. Explain Indian and international quality systems.

Section C (Essay)

Answer any two of the following (2x10= 20 Marks)

24. Explain the inspection requirements for milk and milk product industries.
25. Discuss GLP regulations and principles.
26. Explain in detail food product recall.
27. Explain the inspection requirements for frozen food establishments.