



UNIVERSITY OF CALICUT

Abstract

General and Academic - B.Voc Programme in Food Science 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. 11223/2022/Admn

Dated, Calicut University.P.O, 06.06.2022

- Read:-*1. U.O. No. 7135/2021/Admn dated 19.07.2021
2. Minutes of the Board of Studies in Food Science held on 22.03.2022
3. Remarks of the Dean, Faculty of Science 17.05.2022
4. Orders of the Vice Chancellor in the file no.120153/GA-IV-J1/2018/Admn Dated 07.04.2022.

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 for B.Voc Programme in Food Science 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 Science, 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 Science, 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 as ordered by the Vice Chancellor.
5. Orders are issued accordingly. (Scheme and Syllabus appended)

Abdussamad M

Assistant Registrar

To

Principals of the Colleges offering B.Voc Programme in Food Science

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

Forwarded / By Order

Section Officer

UNIVERSITY OF CALICUT

Syllabus for

B.Voc.Food Science

In accordance with Regulation of

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

- 2021 (CBCSS VUG 2021) of UNIVERSITY OF CALICUT

2021- 22 Admission onwards

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 Science programme refers to the entire course of study and examinations for the award of the B. Voc degree in Food Science.

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
- 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 and Food science.
 - b) They will demonstrate an ability to identify, formulate and solve processing problems related to food sector/industry.
-

- c) They will be able to focus on the importance of safe processed nutritious food.
- d) They will get exposure to various sectors of Food manufacturing system..
- 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 a 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 4** . Biotechnology, Biochemistry, Aquaculture and Plant Science.

No	Semester	Course No	Course Code	Course Name
1	1	1.1	A01	ENG1A01
2		1.2	A02	ENG1A02
3		1.3	A07(3)	MAL 1A07(3) HIN 1A07(3) ARA 1A07(3)
4	2	2.1	A03	ENG2A03
5		2.2	A04	ENG2A04
6		2.3	A08(3)	MAL 2A08(3) HIN 2A08(3) ARA 2A08(3)
7	3	3.1	A11	Biodiversity- Scope And Relevance
8		3.2	A12	Research Methodology
9	4	4.1	A13	Natural Resource Management
10		4.2	A14	Intellectual Property Rights

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.

B. 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	CREDITS	SEMESTER
Environment Studies	4	1
Disaster Management	4	2
*Human Rights /Intellectual Property Rights /Consumer Protection	4	3
*Gender Studies/Gerontology	4	4

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

Credit Distribution of B.Voc. Food Science

Semester	General Education Component			Skill Development Component	Total
	English	Additional Language	General		
I	3+3	4		20	30
II	3+3	4		20	30
III		-	4 4	26	30
IV		-	4 4	26	30
V	-	-	- -	30	30
VI	-	-	- -	30	30
Total	12 Credits (300 Marks)	8 Credits (200 Marks)	16 credits (400 Marks)	152 Credits (3050Marks)	180
	36 Credits (900 Marks)			152 credits(3050)	3950

Mark Distribution

Subject	Marks Alloted	Total	G.Total
English	2x75 2x75	300	500
Additional: Mal/Arabic.....	2x100	200	
GEC	4x100	400	400
SDC	(24x100) + (6x75)+(1x200)	3050	3050

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 sameas 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 / Governing Council in the institution 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 University examinations at the end of each semester.
- b) Practical examinations shall be conducted by the University as prescribed by the Board of Studies. External viva-voce, if any, shall be conducted along with the practical examination/project evaluation.
- c) The medium of examination is either in English or Malayalam as stipulated by the Board of Studies of each programme.
- 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 & 6th semester

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	Outstanding	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	6.5 - 7.49	
45 to below 55	C	Average	5	4.5 - 5.49	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)

CRP Based on Attendance (20%) (Max -4 Marks)	Assignment (20%) (Max -4 Marks)	Seminar (20%) (Max -4 Marks)	Test paper (40%) (Max -8 Marks)
85 % and Above - 4 marks	Excellent - 4 marks	Excellent - 4 marks	85%-100 % - 8 marks
75 % - < 85 % - 2 marks	Very Good - 3 marks	Very Good - 3 marks	65% to 85% - 6 marks
50 % - < 75 % - 1 mark	Good - 2 marks	Good - 2 marks	55% to 65% - 4 marks
	Average - 1 mark	Average - 1 mark	45% to 55% - 3 marks
			35% to 45% - 2 marks
			Less than 35% - 1 mark

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

components	maximum marks 20
Attendance	5
Performance	5
Viva-voce	10

Distribution of Marks for Practical 1-3 credits (Max Internal 15)

components	maximum marks 15
Attendance	2.5
Performance	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

B. 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.

C. 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 is find 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	60	10
Viva-voce	20	10
Total	80	20

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

D. 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.

E. 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.

F. 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.

G. 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, Preservation Techniques	2 semester	Level 5
Advanced Diploma in Food Processing	4 semester	Level 6
B. Voc Degree in Food Science	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
Sub Sector

Food Processing
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)	Plant Baker FIC/Q5001 Supervisor : Fruits and Vegetables QA/QC Executive
Level 6 (2 year)	Food Packaging Technician Food Analyst QHSE Officer
Level 7 (3 year)	Food Regulatory Affairs Manager Production MANager

B. VOC FOOD SCIENCE SYLLABUS OUTLINE

C. NO.	COURSE CODE	COURSE TITLE	HOURSE/WEEK	CREDIT S	MARKS		
					INTERN AL	EXTERN AL	TOTA L
SEMESTER I							
1.1	A01	ENGLISH	3	3	15	60	75
1.2	A02	ENGLISH	3	3	15	60	75
1.3	A07 (3)	MALAYALAM/ HINDI/ARABIC	4	4	20	80	100
1.4	SDC1FP01	FOOD MICROBIOLOGY	4	4	20	80	100
1.5	SDC1FP02	FOOD SCIENCE AND NUTRITION	4	4	20	80	100
1.6	SDC1FP03	BASIC STUDY OF BAKERY AND CONFECTIONARY	4	4	20	80	100
1.7	SDC1FP04	PRINCIPLES OF FOOD PRESERVATION	4	4	20	80	100
1.8	SDC1FP05(P)	BASIC STUDY OF BAKERY AND CONFECTIONARY (P)	4	4	20	80	100

1.9	AUDIT COURSE I	ENVIRONMENT STUDIES		4				
TOTAL			30	30				750
SEMESTER II								
2.1	A03	ENGLISH	3	3	15	60	75	
2.2	A04	ENGLISH	3	3	15	60	75	
2.3	A08(3)	MALAYALAM/HINDI/ARABIC	4	4	20	80	100	
2.4	SDC2FP06	FOOD CHEMISTRY	4	4	20	80	100	
2.5	SDC2FP07	COMPOSITION & PROCESSING OF PLANT ORIGIN FOODS	4	4	20	80	100	
2.6	SDC2FP08(P)	FOOD CHEMISTRY (P)	4	4	20	80	100	
2.7	SDC2FP09 (P)	FOOD MICROBIOLOGY(P)	4	4	20	80	100	
2.8	SDC2FP10I-1	INTERNSHIP/PROJECT	4	4	20	80	100	
2.9	AUDIT COURSE II	DISASTER MANAGEMENT		4				
TOTAL			30	30				750
SEMESTER III								
3.1	A11	BIODIVERSITY- SCOPE AND RELEVANCE	4	4	20	80	100	
3.2	A12	RESEARCH METHODOLOGY	4	4	20	80	100	
3.3	SDC3FP11	BASIC CONCEPTS OF BEVERAGES	4	4	20	80	100	
3.4	SDC3FP12	FOOD PACKAGING	4	4	20	80	100	
3.5	SDC3FP13	SANITATION AND HYGIENE	4	4	20	80	100	
3.6	SDC3FP14	SENSORY EVALUATION OF FOODS	4	4	20	80	100	
3.7	SDC3FP15(P)	COMPOSITION & PROCESSING OF PLANT ORIGIN FOODS (P-1)	3	3	15	60	75	
3.8	SDC3FP16(P)	COMPOSITION & PROCESSING OF PLANT ORIGIN FOODS (P-2)	3	3	15	60	75	
3.9	AUDIT COURSE III	HUMAN RIGHTS		4	150			
TOTAL			30					750
SEMESTER IV								
4.1	A13	NATURAL RESOURCE MANAGEMENT	4	4	20	80	100	
4.2	A14	INTELLECTUAL	4	4	20	80	100	

		PROPERTY RIGHTS					
4.3	SDC4FP17	COMPOSITION & PROCESSING OF ANIMAL ORIGIN FOODS	4	4	20	80	100
4.4	SDC4FP18	INSTRUMENTAL ANALYSIS OF FOOD	4	4	20	80	100
4.5	SDC4FP19	FOOD TOXICOLOGY	4	4	20	80	100
4.6	SDC4FP20(P)	COMPOSITION & PROCESSING OF ANIMAL ORIGIN FOODS (P-1)	3	3	15	60	75
4.7	SDC4FP21(P)	INSTRUMENTAL ANALYSIS OF FOOD (P)	3	3	15	60	75
4.8	SDC4FP22I-2	INTERNSHIP/PROJECT	4	4	20	80	100
4.9	AUDIT COURSE IV	GENDER STUDIES		4			
TOTAL			30	30			750
SEMESTER V							
5.1	SDC5FP23	FOOD LAWS AND REGULATIONS	4	4	20	80	100
5.2	SDC5FP24	BYPRODUCT UTILIZATION & WASTE MANAGEMENT	4	4	20	80	100
5.3	SDC5FP25	FOOD ADULTERATION	4	4	20	80	100
5.4	SDC5FP26	QUALITY ASSURANCE AND CERTIFICATIONS IN FOOD INDUSTRIES	4	4	20	80	100
5.5	SDC5FP27	FOOD ADDITIVES & FLOVOURS	4	4	20	80	100
5.6	SDC5FP28	FOOD PROCESSING EQUIPMENTS	4	4	20	80	100
5.7	SDC5FP29(P)	FOOD ADULTERATION(P)	3	3	15	60	75
5.8	SDC5FP30(P)	COMPOSITION & PROCESSING OF ANIMAL ORIGIN FOODS (P-2)	3	3	15	60	75
TOTAL			30	30			750
SEMESTER VI							
6.1	SDC6FP31(Pr)	MAJOR INTERSHIP/MAIN PROJECT/DISSERTATION		30	40	160	200
TOTAL			900 hrs		40	160	200

B. Voc Programme in Food Science
Detailed Syllabus
SEMESTER I

Course No. 1.4
Course Code: SDC1FP01
Course Title: FOOD MICROBIOLOGY
Credits: 4
Total contact hours: 60 Hrs

Objectives

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

Course 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.

Module I Evolution

10 hrs

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.

Module II Microorganisms Bacteria

10 hrs

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

Module III Culture Media

10 hrs

Bacteriological Media – Selective, Differential, Enrichment Media. **Methods of isolating Pure culture:**

Serial dilution, Pour plate, streak plate, stroke Culture

Module IV Control of Microorganism

10 hrs

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

Module V Food spoilage

10 hrs

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

Module VI (Microbial intoxications & Infections)

10 hrs

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

References

1. Banwart GJ ,1989. Basic Food Microbiology. AVI publishers
2. Jay JM, Loessner MJ & Golden D A,2005. Modern Food Microbiology .SpringerVerlag
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

Course No. 1.5

Course Code: SDC1FP02

Course Title: FOOD SCIENCE AND NUTRITION

Credits: 4

Total contact hours: 60 hrs

Objectives

To understand the nutrient composition of foods, their functions, sources and to impart knowledge of concept of good health and its importance.

Course outcome

- To know and understand the functions, importance of all nutrients present in foods.
- To know about the various types of nutrients and their functions in the body.
- To familiarize with the recent advances in field of nutrition
- To understand the different types of newly developed food products.

Syllabus Content

Module I Introduction to Nutrition**12 Hours**

Definition of nutrition and health, inter-relationship between nutrition and health. Malnutrition: Definition and types. Reference man and reference women.

Module II: Food and water**12 Hours**

Definition of food, classification of foods based on origin, pH, nutritive value. Basic five food groups, food guide pyramid. Functions of foods. New concepts of food: health foods, ethnic foods, organic foods, functional foods, nutraceuticals, fabricated foods, extruded foods, convenience foods, junk foods, GM foods and proprietary foods. Water: functions, sources, requirement, water balance, toxicity and deficiency.

Module III: Vitamins**12 Hours**

Classification, structure, function, sources, general causes for loss in foods, bioavailability, enrichment, fortification and restoration. Units of measurement. Deficiency and toxicity disorders.

Module IV: Minerals**12 Hours**

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

Module V: Energy**12 Hours**

Units of energy, food as a source of energy, basal metabolic rate, factors effecting BMR, total energy Requirement.

References

1. James L Groff and Sareen S Gropper, (2009) "Advanced Nutrition and Human Metabolism", Fourth Edition, Wadsworth Publishing Company.
2. Maurice B Shils, Moshe Shike A, Catherine Ross, Benjamin Cabellero, Robert J Cousins, (2006), "Modern Nutrition in Health and Disease", Lippincott Williams al Wilkins.
3. Michael J Gibney, Ian A Macdonald and Helen M Roche (2003) "Nutrition and Metabolism", The Nutrition Society Textbook Series, Blackwell Publishing, First Edition.

Course No. 1.6
Course Code: SDC1FP03
Course Title: Basic Study Of Bakery And Confectionary
Credits: 4
Total Contact Hrs: 60 Hrs

Objectives

To impart basic and applied technology of baking and confectionary and acquaint with the manufacturing technology of bakery and confectionary products.

Course outcome

- To highlight the processing methods used in baking and confectionery industries.
- To know about the various types of food products made using baking technology.
- To have a basic idea about baking and confectionery manufacture and quality control.
- To know about the importance of each ingredient in the bakery and how it effects the overall product and its sensory and quality parameters.
- To be able to start a small scale bakery and confectionery unit

Syllabus Content

Module I: Manufacture of Sugar

12 Hours

Sugarcane, jaggery, khandasari sugar, raw sugar, refined sugar, white sugar, beet sugar, manufacture of sugar from sugar cane, refining of sugar.

Module II: Classification of confectionery

12 Hours

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

Module III: Properties of wheat

12Hours

Wheat – Properties, Quality – Hardness, Gluten strength, protein content, soundness.

Methodology and approaches to evaluate bread and bread – processing factors, product factors.

Module IV: Principles of baking and Bread manufacturing

12 Hours

Major baking ingredients and their functions, role of baking ingredients in improving the quality of bread. Characteristics of good flour used for making bread, biscuits and cakes. Ingredients used for bread manufacture, methods of mixing the ingredients, dough development methods - straight dough, sponge dough, moulding, proofing, baking, packing, spoilage, bread staling, methods to reduce bread staling and spoilage.

Module V: Cake and Biscuit manufacturing**12 Hours**

Processing of cakes and biscuits- ingredients, development of batter, baking and packing, Spoilage in cakes and biscuits.

References:

1. Zhou. W, HuiY,H; (2014), "Bakery Products Science and Technology", 2nd Edition, Wiley Blackwell Publishers,
2. Pyler, E. J. and Gorton, L.A.(2009), "Baking Science & Technology" Vol.1 Fourth Edition,Sosland Publications.
3. Stanley P. Cauvain, Linda S. Young, (2008), "Baked Products: Science
4. Technology and Practice".John Wiley & Sons Publishers.

Course No. 1.7**Course Code: SDC1FP04****Course Title: Principles of Food Preservation****Credits: 4****Total Contact Hrs: 60 Hrs**

Objectives:

To make students understand about the mechanism of spoilage and deterioration in foods, the basic food preservation principles, and methods to preserve foods.

Course outcome

- To study the different ways in which food spoilage occurs and the techniques to prevent it.
- To know the different spoilage agents and the ways in which they act on food.
- To understand the principles behind the various methods of food preservation.
- To know how to use these principles to preserve different types of foods.
- To study the method of action of different preservatives.

Syllabus Content**Module I: Food Spoilage****12 Hours**

Definition, types of spoilage - physical, enzymatic, chemical and biological spoilage. Mechanism of spoilage and shelf life determination.

Module II: Preservation by using Preservatives**12 Hours**

Food preservation: Definition, principles, importance of food preservation, traditional (drying, curing, smoking, sugaring, canning, freezing, salting, fermentation) and modern methods of food preservation (HPP, PEF, paturisation, vaccum packaging, MAP, ohmic heating, hurdle technology, microwave, ultra wave). Food additives – definition, types, Class I and Class II preservatives.

Module III: Preservation by use of high temperature

12 Hours

Pasteurization: Definition, types, Sterilization, Canning - history and steps involved, spoilage encountered in canned foods, types of containers used for canning foods. Food irradiation – Principles, merits and demerits, effects of irradiation.

Module IV: Preservation by use of Low Temperature

12 Hours

Refrigeration - advantages and disadvantages, freezing: Types of freezing, common spoilages occurring during freezing, difference between refrigeration and freezing.

Module V: Preservation by Removal of Moisture

12 Hours

Drying and dehydration - merits and demerits, factors affecting, different types of drying, Concentration: principles and types of concentrated foods.

References

1. Gould, G. W. (2012), "New Methods of food preservation", Springer Science & Business Media.
2. Manay, N.S. Shadaksharaswamy, M. (2004), "Foods- Facts and Principles", New age international publishers, New Delhi.
3. Srilakshmi, B.(2003), "Food Science", New Age International Publishers, New Delhi.
4. Subalakshmi, G and Udipi, S.A.(2001), "Food processing and preservation". New Age International Publishers, New Delhi.

Course No. 1.8

Course Code: SDC1FP05(P)

Course Title: Basic Study Of Bakery and Confectionary (P)

Credits: 4

Total Contact Hrs: 60 Hrs

Objectives

To develop professional and practical knowledge in bakery and Confectionary and make them competent as an entrepreneur.

Course outcome

- To improve the culinary skills of the students

- To gain knowledge about the preparation of some basic food products
- To use the processes studied in food chemistry and food preservation papers to prepare different food products
- To understand how these can be utilized to start a small scale processing unit.
- It involves not only gaining knowledge on how to make a food product but also studies the principles behind them.
- It helps the students to gain not only theoretical but also practical knowledge

Syllabus Content

1. Preparation of ghee biscuits
2. Preparation of melting marvels
3. Preparation of sweet and salt biscuits
4. Preparation of bread
5. Preparation of pizza

6. Preparation of hot cross buns(sweet buns)
7. Preparation of jamnut cookies
8. Preparation of vanilla cake
9. Preparation of cake.
10. Visit to production unit of a bakery

SEMESTER II

Course No. 2.4

Course Code: SDC2FP06

Course Title: FOOD CHEMISTRY

Credits: 4

Total Contact Hrs: 60 Hrs

Objectives

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

Course 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.

Syllabus Content

Module I

(12 hrs)

Carbohydrates -Classification, properties and reactions of Monosaccharides ;Glucose& Fructose, Oligosaccharides ;Maltose, lactose. Sucrose- properties- crystallization and inversion. Polysaccharides; starch : components of starch, gelatinization, retrogradation, modified starch. Cellulose, hemicellulose, pectic substances, gums, dietary fibre.

Module II (12 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

Module III (12 hrs)

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

Module IV (12 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.

Module V (12 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

Course No. 2.5

Course Code: SDC2FP07

Course Title: Composition & Processing of Plant Origin Foods

Credits: 4

Total Contact Hrs: 60 Hrs

Objective

To understand about the proper post harvest handling technologies of plant origin food products and to know the process development.

Course Outcomes

- To know about the status of fruit and vegetable production in India with importance to losses.

- To study about the processing of fruits and vegetables.
- To impart knowledge about the various products from them.
- To study the various methods of drying of fruits and vegetables To create awareness about the processing of major cereals like paddy, maize.
- To study the storage and handling techniques of cereals, oilseed and pulses.
- To gain knowledge on processing and milling of pulses and extraction of oil.
- To know about the importance of various types of spices which are used in the food industry and their applications
- To understand the processing steps involved in spice processing
- To know about value added products from spices
- To know various processing steps involved in plantation crop processing

Syllabus Content

Module I: Fruits and Vegetables

15 hrs

Composition and nutritive value of fruits and vegetable. Factors affecting composition and quality of fruits and vegetables. Quality requirements of raw materials for processing; sourcing and receiving at processing plants, primary processing: grading, sorting, cleaning, washing, peeling, slicing and blanching, 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.

Module II :Value Added products from Fruits and Vegetables

15 hrs

Fruit powders using spray drying. Technology of extraction of juices from different types of fruits, Manufacturing process of juice, soup, puree, and paste, Jams, Jellies and marmalades: selection, preparation, production. Difference between jam and jelly. Theory of jell formation, failure and remedies in jam and jelly making. General principles and manufacturing processes of preserves, candied fruits, glazed fruits, crystallized fruits, sauce, ketchup, vegetable juices and concentrated products.

Module III : Cereals , Pulses & Oil Seeds

15 hrs

A) Rice

Composition and Quality characteristics of paddy ,Curing of Paddy. Parboiling Processes soaking, steaming, drying, CFTRI and pressure parboiling process, Paddy Dryer - LSU Dryer. Production of Flattened Rice and Puffed Rice from Paddy. Paddy Dehusking Processes. Rice Mill Flow Chart. Modern Rice Mills – Their Components - Pre Cleaners, rubber roll Shellers, Paddy Separators – Satake type, Polishers - Cone polishers, glazing, Extraction of rice bran oil and uses of rice bran in food industry.

B) wheat

Wheat - composition and nutritional value, wheat milling process – cleaning, conditioning/ hydrothermal treatment, milling-break roll and reduction rolls.

C) Pulses

Varieties-chemical composition and structure-dry milling and wet milling process of pulses, processed

products of pulses.

D) Oil Seeds

Introduction- methods- hydraulic press- screw press – principle and working, solvent extraction methods, Clarification, degumming, neutralization, bleaching, deodorization techniques/process, blending of oils. Hydrogenation, Fractionation, Winterization.

Module IV : Herbs & Spices

15 hrs

Introduction, classification, composition and functions. Major international quality specifications of spices. Spice processing, spice reconditioning, spice grinding, post processing treatments, Major spices: Pepper, cardamom, ginger, clove, nutmeg, vanilla, cinnamon, chilli and turmeric – method of manufacture; chemistry of the volatiles; enzymatic synthesis of flavour identical, Value added spice products: Spice volatile oils, spice oleoresins, Use of spice extractives, replacement of spices with oils and oleoresins, alternative products, Ground spices, processed spices, organic spices, curry powders, Composition, Structure and characteristics of cashew nut, uses, Traditional method of cashew processing, General processing, Cashew apple processing, cashew by product - CNSL.

References:

1. NirmalSinha, Y. H. Hui, et al; (2010), "Handbook of Vegetables and Vegetable Processing", John Wiley & Sons.
2. Olga Martin-Belloso, Robert SolivaFortuny, (2010), "Advances in Fresh-Cut Fruits and Vegetables Processing". CRC Press.
3. W Jongen (2002), "Fruit and Vegetable Processing: Improving Quality", Elsevier Publications.
4. Dendy DAV & Dobraszczyk BJ. (2001), "Cereal and Cereal Products", Aspen Publications.
5. Chakraverty, A. (1995), "Post Harvest Technology of Cereals, Pulses and Oilseeds". Oxford and IBH Publishing Co, Calcutta
6. N.L.Kent and A.D.Evans: (1994) "Technology of Cereals" (4th Edition), Elsevier Science (Pergaman), Oxford, UK,
7. Samuel Matz: (1992), "The Chemistry and Technology of Cereals as Food and Feed, Chapman & Hall

Course No. 2.6

Course Code: SDC2FP08(P)

Course Title: Food Chemistry (P)

Credits: 4

Total Contact Hrs: 60 Hrs

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

Course 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 vappupets; 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

Syllabus Content

- 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 – kjeldhal’s method
- Analysis of water – Total solids, Acidity of water, Alkalinity of water, Determination of chloride, Hardness of water
- Paper chromatography
- Ash content

Course No. 2.7
Course Code: SDC2FP09(P)
Course Title: FOOD MICROBIOLOGY (P)
Credits: 4
Total Contact Hrs: 60 Hrs

Objective

To understand the basic concepts of food microbiology.

Course Outcomes

- To analyse the spices its oleoresin and oil extraction
- To gain knowledge in the preparation of fermented foods
- To introduce basics of food microbiology.

Syllabus Content

1. Demonstrations of process of essential oil extraction and oleoresin of different spice
2. Detection of papaya seeds in black pepper.
3. Detection of powdered bran and sawdust in spices
4. Preparation of fermented foods
5. Introduction to the Basic Microbiology Laboratory Practices and Equipments
6. Functioning and use of compound microscope
7. Cleaning and sterilization of glassware
8. Preparation and sterilization of nutrient broth.
9. Preparation of slant, stab and plates using nutrient agar.
10. Standard Plate Count Method.
11. Methylene blue reduction test.
12. Production of wine.
13. Isolation of microbial flora of fermented milk.
14. Aerobic mesophilic count of milk.
15. Visit to Meat Products of India

SEMESTER III

Course No. 3.3

Course Code: SDC3FP11

Course Title: Basic Concepts Of Beverages

Credits: 4

Total Contact Hours: 60 Hrs

Objective

The aim of the course is to provide the students with general scientific knowledge about processing of alcoholic and non- alcoholic beverages.

Course Outcomes

- To study about the various beverages.
- To study about the products made out of them.
- To provide a technical view of beverages.
- To understand the manufacturing processes in the context of technology.

Syllabus content

Module I: Introduction to beverages

12 Hours

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

Module II: Manufacturing process of beverages

12 Hours

Beverages based on tea, coffee, cocoa, spices, plant extracts, herbs, nuts, Dairy-based beverages.

Module III: Types of coffee and tea

12 Hours

Chemical composition and processing of tea and coffee and their quality assessment. Types of tea: black tea, green tea, oolong tea. Types of coffee: Vacuum coffee, drip coffee, iced coffee. Espresso coffee, instant coffee. Decaffeination of Coffee types of decaffeination: Roselius method, swiss water process, direct and indirect method, triglyceride method, carbon dioxide method.

Module IV: Alcoholic beverages**12 Hours**

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.

Module V: Packaged drinking water**12 Hours**

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. Manay, N.S, Shandaksharaswamy, M., (2004), "Foods- Facts and Principles", New Age International Publishers, New Delhi,
2. Potter, N.N, Hotchkiss, J.H.(2000), "Food Science". CBS Publishers, New Delhi.
3. Srilakshmi, B. Food Science (3rd Edition) (2003), New Age International (p) Limited Publishers, New Delhi,
4. Nicholas Dege. (2011), "Technology of Bottled water".Blackwell publishing Ltd, UK.

Course No. 3.4**Course Code: SDC3FP12****Course Title: Food Packaging****Credits: 4****Total Contact Hrs: 60 Hrs**

Objective

To provide knowledge about trends and development in food packaging technologies and materials.

Course Outcomes

- To familiarize with the different materials and methods used for packaging.
- To understand the technology behind packaging and packaging materials
- To have a basic idea about the materials used for food packaging and their testing.
- To know about the different forms in which a food can be packed.

Syllabus Content**Module I: Introduction to packaging****12 Hours**

Definition, Functions of packaging – Containment, Protection, Preservation, Promotion, Convenience, Communication. Requirements of effective package, Types of food packaging- primary, secondary and tertiary packaging.

Module II: Deteriorative Reactions and shelf life of foods **12 Hours**

Introduction, deteriorative Reactions in food- factors affecting deterioration of foods physical changes, biological changes, chemical changes. Shelf life of foods – Definition, intrinsic and extrinsic factors controlling the rate of reactions. Shelf life determination tests.

Module III: Packaging Materials and their properties **12 Hours**

Rigid containers- Glass, Wooden boxes, metal cans- Aluminium and tin plate containers, Semi rigid containers- paperboard cartons, Flexible packaging- paper, plastic pouches- Low density polyethylene, High density polyethylene and Polypropylene. Packaging materials for dairy products, bakery and confectionary, granular products, fruits and vegetables.

Module IV: Special Packaging **12 Hours**

Aseptic packaging, Active packaging, Intelligent packaging, Modified atmospheric packaging and controlled atmospheric packaging, Shrink packaging, stretch packaging, Biodegradable packaging, Edible packaging, Tetrapacks.

Module V: Labelling and safety concerns in food pack **12 Hours**

Printing process, inks, adhesives, labelling, coding- bar codes, Food packaging closures of glass and plastic containers, Legislative and safety aspects of food packaging, Machineries used in Food Packaging, Package testing- Thickness – Paper density - Basis weight – Grammage - Tensile Strength - Gas Transmission Rate (GTR) - Water Vapour Transmission Rate (WVTR).

References:

1. Gordon L. Robertson (2012), "Food Packaging: Principles and Practice", Third Edition, CRC Press.
2. Takashi Kadoya (2012), "Food Packaging", Academic press.
3. Richard Coles, Derek McDowell, Mark J. Kirwan (2003), "Food Packaging Technology", CRC Press.

Course No. 3.5

Course Code: SDC3FP13

Course Title: Sanitation And Hygiene

Credits: 4

Total Contact Hrs: 60 Hrs

Objectives

To know the principles and applications of sanitation in food industry

Course Outcomes

- To acquire the knowledge of the importance of sanitation and hygiene in food industries
- To know about different hazards in food industries.
- To get an idea of about various sanitation methods.
- To familiar some of the food sanitizing agents .

Syllabus Content

Module I Sanitation; Introduction

12 Hrs

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

Module II Food Sanitizers

12 Hrs

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

Module III Sanitation equipments and systems in Food Industry

12 Hrs

Mechanized sweepers and scrubbers, high pressure cleaners, CIP and COP equipment. Membrane Cleaning. Quality of water used for food processing, Water quality standards. Waste product handling, Suspended solids, Total solids, BOD & COD requirements. Wastewater treatment and disposal.

Module IV Food handling and personal hygiene

12 Hrs

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

Module V Insect & Pest Control

12 Hrs

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

References :

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

Course No. 3.6

Course Code: SDC3FP14

Course Title: SENSORY EVALUATION OF FOOD

Credits: 4

Total Contact Hrs: 60 Hrs

OBJECTIVES

To acquire the knowledge on quality parameters and the a study on sensory evaluations of food matrices.

Course Outcomes

- To understand different aspects of sensory science and its application.
- To be able to use sensory evaluation as an analytical tool.

Module I Introduction To Sensory Evaluation And Quality Attributes

12 hrs

Definition and importance of sensory evaluation, Quality attributes –appearance, flavor, texture and additional quality factors

Module II Practical requirements and general testing conditions

12 hrs

Testing area, testing set up ,lighting, testing schedule, preparation of samples, sample coding ,evaluation card preparation, Trained & untrained panel members

Module III Sensory Assessment Of Food Quality

12 hrs

TASTE (GUSTATION): Introduction, importance of gestation. Taste sense to mouth, tongue. Chemical dimensions of basic tastes- sweet, bitter, sour, salt and umami. Taste enhancers, perception of taste. Taste measurement- E-tongue. **ODOUR AND FLAVOR (OLFACTION):** Introduction and importance of odour and flavor. Smelling techniques- Vonskramlk Test. E- Nose and theories of olfaction. **COLOUR:** Introduction and importance of color. Dimensions of color, perception of color. **TEXTURE:** Introduction, definition and importance. Texture classification. Texture measurement. **OTHER SENSES:** Temperature sensation, pain sensation, touche sensation, kinesthetic sensations, and sound sensations etc.

Module IV Sensory Testing Of Foods

12 hrs

Threshold tests, Descriptive test, Discriminative tests, Ranking tests, Hedonic tests, Acceptance and preference tests, Scoring tests, Sensitivity tests

Module V Data Analysis

12 hrs

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

References:

- Jellinek, G., Sensory Evaluation of Food-Theory and Practice., Elis HorwoodLtd.,England.,1985.
- Srilakshmi,B., Food Science., New Age International (P) Limited., New Delhi.,2005.
- Manay,S., Shadaksharaswamy, M., Food Facts and Principles, New Age International (P) Limited., New Delhi., 2008.

Course No: 3.7
Course Code: SDC3FP15(P)
Course Title: COMPOSITION AND PROCESSING OF PLANT ORIGIN FOODS
(P- 1)
Credits: 3
Total Contact Hrs: 45 Hrs

Objective

To study the principles and methods of preservation of fruits and vegetables into various products and to practically gain skill in development of these products.

Course Outcomes

- To understand the Handling and operating of food processing equipment's and Instruments.
- To acquire knowledge about Quality analysis and quality testing of fruit and vegetable products.
- To prepare different fruit and vegetables products.

Syllabus Content

1. Handling and operating of food processing equipments and Instruments

1. Pulper
2. Sealers
3. Juice extracting machines
4. Autoclaves
5. Corking machines
6. Refractometer
7. Salinometer
8. Hydrometers
9. Jelmeter
10. Thermometer
11. Vacuum gauge, pressure gauge, seam checking gauge
12. Electronic weighing balance

2. Quality analysis

1. Quality evaluation of fruits and vegetables.
2. Quantitative analysis of cut fruits and vegetable yield.
3. Effects of pre-treatment on quality of cut fruits and vegetables.
4. Refrigeration storage of fruits and vegetables
5. Determination of Maturity indices of fruits & vegetables.

3. Quality Testing

1. Determination of Degree Brix (TSS), pH and % acidity in fruits and
2. vegetable products.

3. Estimation of benzoic acid, sulphur dioxide and KMS in terms of ppm
4. present in fruits and vegetable products.
5. Estimation of reducing and non-reducing sugars in fruit and vegetable
6. products
7. Estimation of chloride content in food products.

4. Preservation techniques

1. Extraction of juice by different methods.
2. Preservation of fruits juices with addition of preservative.
3. Preparation of fruit and synthetic beverages.
4. Preparation of carbonated beverages.

5. Product Preparation

1. Preparation of tomato juices, puree, sauces, ketchups, soup, paste.
2. Comparison of juice/pulp extraction methods on quality and yield of tomato pulp.
3. Preparation of jam, jelly and marmalades.
4. End point determination in preparation of high sugar product.
5. Preparation of preserves, candies, crystallized and glazed fruits and fruit bars.
6. Effects of pre- treatment and process variables on quality of preserve and candied fruits.
7. Preparation of chutney
8. Preparation of sauerkraut, gherkins, cauliflower, lime, mango and mixed pickles.

Course No: 3.8

Course Code: SDC3FP16(P)

**Course Title: COMPOSITION AND PROCESSING OF PLANT ORIGIN FOODS
(P- 2)**

Credits: 3

Total Contact Hrs: 45 Hrs

Objective

To study the principles and methods of preservation of fruits and vegetables into various products and to practically gain skill in development of these products.

Course Outcomes:

- To understand the physical properties of cereal flours.
- To impart knowledge on working of a rice milling station.
- To impart knowledge on working of a oil expelling unit station.

Syllabus Content

1. Physical characteristics of Wheat.
2. Estimation of Gluten Content of flour.

3. Isolation of rice starch and its qualification
4. Estimation of Potassium Bromate in flour.
5. Fermenting power of yeast.
6. Physical Characteristics of Rice and paddy.
7. Cooking characteristics of rice.
8. Determination of sedimentation power of flour.
9. Visit to rice mill station.
10. Visit to oil expelling unit.

SEMESTER IV

Course No. 4.3

Course Code: SDC4FP17

Course Title: COMPOSITION AND PROCESSING OF ANIMAL ORGIN FOODS

Credits: 4

Total Contact Hours: 60 hrs

Objectives

To enable the students to understand the importance and methods of post processing Technology of Animal foods.

ModuleI- Introduction to post harvest technology 12 hrs

Introduction, Definition, Primary and secondary processing, Importance.

ModuleII-Processing technology of milk and milk products 12 hrs

Milk- Definition, composition, method of manufacture, use. Butter- Definition, composition, method of manufacture, use. Butter Oil- Definition, composition, method of manufacture, use. Ice cream- Definition, composition, method of manufacture, use. Cheese- Definition, composition, method of manufacture, use. Condensed milk- Definition, composition, method of manufacture, use. Dried Milk- Definition, composition, method of manufacture, use. Yoghurt- Definition, composition, method of manufacture, use. Indian Dairy Products- Kheer, Khoa, Rabri, Kulfi, Dahi, Shrikdhand, Paneer, Channa, Ghee.

Module III- Processing technology of egg 12 hrs

Changes during storage, processing, functions of egg in cookery, Egg Quality, Egg Grading, Egg products

Module IV- Processing technology of meat and poultry 12 hrs

Meat- types methods of slaughter, Antimortem inspection, Post mortem changes in meat, Tenderizing of meat, Grading of Meat, Processing of meat, Sausage, Salami, Bacon, Ham. **Poultry**- Classification, processing

Module V- Processing technology of fish 12 hrs

Types of sea foods, Fish processing, Fish products

References:

- Kent, J.A. Riegels Handbook of Industrial Chemistry, 7th edition. Van Nostrand Reinhold Company, New York. 2003.
- Dubey, R.C. A Textbook of Biotechnology. S.Chand & Company Limited, New Delhi. 2000.
- Prescott and Proctor B.E. Food Technology. MC Graw Hill Book Co. New York 1997.
- Potter, N. N., Hotchkiss, J. H. Food Science. CBS Publishers, New Delhi. 2000.

Course No. 4.4
Course Code: SDC4FP18
Course Title: Instrumental Analysis Of Food
Credits: 4
Total Contact Hours: 60 hrs

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

Course 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.

Module I

12 hrs

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

Module II

12 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.).

Module III

12 hrs

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

Module IV**12 hrs**

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

Module V**12 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.

Course No. 4.5**Course Code: SDC4FP19****Course Title: Food Toxicology****Credits: 4****Total Contact Hours: 60 hrs****Objectives**

To acquire knowledge about the injurious effects on living systems of chemicals present in foods through various ways.

Course Outcomes

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

Module I**15 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.

Module II**15 hrs**

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

Module III**15 hrs**

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

Module IV**15 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.

Course No. 4.6**Course Code: SDC4FP20(P)****Course Title: Composition & Processing Of Animal Origin Food (P-1)****Credits: 3****Total Contact Hours: 45 hrs****Objectives**

To develop the skills in dairy product preparation and to familiarise with the dairy plant equipments.

Course Outcome

- To gain knowledge about preparation of some dairy products
- To perform chemical analysis of milk sample
- To understand different processing equipment in dairy plant

Syllabus Content

- Milk Testing - Platform Tests.
- Determination of Activity (Titrable Acidity) of Milk.
- Determination of fat and SNF content in milk.
- Clot on boiling test for milk.

- Determination of specific gravity of milk.

- Detection of Addition of Starch in Milk.

- Preparation of Lassi.
- Preparation of khoa.
- Preparation of Basundi.
- Preparation of chakka and shrikand.
- Preparation of kalakand.
- Preparation of cooking butter.
- Preparation of ghee.
- Preparation of flavoured milk.
- Visit to milk product development centre

Course No. 4.7
Course Code: SDC4FP21 (P)
Course Title: Instrumental Analysis of Food (P)
Credits: 3
Total Contact Hours: 45 hrs

Objectives

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

Course 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
Food Safety Standard authority of India site manual **Course**

Semester V

No. 5.1

Course Code: SDC5FP23

Course Title: Food Laws And Regulations

Credits: 4

Total Contact Hours: 60 hrs

Objectives

To Acquaint With Food Quality Parameters And Control Systems, Food Standards, Regulations, Specifications.

Course Outcomes:

- To get an awareness on food laws established in India.
- To get an idea on laws and regulations for food industries for an entrepreneur.
- It will help to know the quality of the products.
- To acquire a clear light on the laws and regulations for a product.

Syllabus Content

Module I

3 Hrs

Introduction And Need Of Enforcing To Food Laws.

Module II

15 Hrs

Mandatory Food Laws; The Food Safety And Standards Act 2006, Establishment Of The Authority,

Composition Of Authoring Functions Of Chief Executive Officer, Scientific Part, General Principles To Be Followed In Revised August 2016 37 Administration Of Act, General Provisions As To Articles Of Food, Special Responsibility As To Safety Of Food, Analysis Of Food Offences Of Penalties.

Module III

17 Hrs

Edible Oils Packaging (Regulation) Order, 1998, Environment (Protection) Act, 1986, Fruit Products Order, 1955 (Fpo), Meat Food Products Order, 1973 (Mfpo), Milk And Milk Product, Order, 1992 (Mmpo), Solvent Extracted Oil, De-Oiled Meal And Edible Flour (Control) Order, 1967.

Module IV

20 Hrs

Standards Of Weights And Measures Act, 1976, The Essential Commodities Act, 1955, The Export (Quality Control And Inspection) Act, 1963, The Insecticides Act, 1968, Vegetables Oil Products(Control) Order, 1998, Prevention Of Food Adulteration Act & Rules (Pfa Act), 1954 , Agmark Standards (Agmark), Codex Alimentarius Standards, Bis Standards And Specifications, Consumer Protection Act, 1986.

Module V

5 Hrs

Recommended International Code Of Hygiene For Various Products.

References:

1. Early R.1995.Guide To Quality Management Systems For Food Industries. Blackie Academic. •Krammer A•&Twigg Ba.1973. Quality Control In Food Industry. Vol. I, li. AviPubl

Course No. 5.2
Course Code: SDC5FP24
Course Title: Byproduct Utilization And Waste Management
Credits: 4
Total Contact Hours: 60 hrs

Objectives

To Understand About The Ways For Effective Utilisation Of The Byproducts Obtained After Food Processing And Also To Gain Knowledge About Characterisation Of Waste Products And Effluent Treatment Methods.

Course Outcome

- To Identify Types Of Wastes In Food Industry
- To Gain Knowledge In Different Effluent Treatment Methods
- To Utilize The Byproduct In The Food Industry

Syllabus Content

Module I Introduction

12 Hours

Types Of Waste And Magnitude Of Waste Generation In Different Food Processing Industries, Concept, Scope And Importance Of Waste Management And Effluent Treatment.

Module II Waste Characterization

12 Hours

Temperature, Ph, Oxygen Demands (Bod, Cod, Tod), Fat, Oil And Grease Content, Metal Content, Forms Of Phosphorous And Sulphur In Waste Waters, Microbiology Of Waste, Other Ingredients Like Insecticide, Pesticides And Fungicides Residues

Module III Effluent Treatment

12 Hours

Pretreatment Of Waste: Sedimentation, Coagulation, Flocculation And Floatation Secondary Treatments: Biological Oxidation (Trickling Filters, Activated Sludge Process), Industrial Wastewater Treatment: Characteristics Of Industrial Wastewater, Treatment Levels

Module IV Waste Utilization Of Agro Industries

12 Hours

Characterization And Utilization Of Byproducts From Cereals (Breweries), Pulses, Oilseeds, Fruits & Vegetables (Wineries) And Plantation Crops (Sugar Industries).

Module V Waste Utilization Of Animal And Marine Product Industries

12 Hours

Characterization And Utilization Of Byproducts From Dairy, Eggs, Meat, Fish And Poultry

References:

1. Abbas Kazmi, Peter Shuttleworth, (2013), "The Economic Utilisation Of Food Co- Products", Royal Society Of Chemistry Publishing.
2. A.M. Martin, (2012), "Bioconversion Of Waste Materials To Industrial Products", Springer Science & Business Media Publishing.
3. Marcos Von Sperling,(2007), "Basic Principles Of Wastewater Treatment", Iwa Publishing.

Course No. 5.3
Course Code: SDC5FP25
Course Title: Food Adulteration
Credits: 4
Total Contact Hours: 60

Objectives

To Introduce Students To Food Safety And Standardization Act And Quality Control Of Foods.

Course outcome

- To Educate About Common Food Adulterants And Their Detection.
- To Impart Knowledge In The Legislative Aspects Of Adulteration.
- To Educate About Standards And Composition Of Foods And Role Of Consumer.

Module I

15 Hrs

Food Adulteration – Introduction Of Food Adulteration, Definition. New Adulterants In Foods. Historical Food Legislation In India; Central Food Laboratory, Municipal Laboratories, Export Inspection Council Laboratory, Central Grain Analysis Laboratory, Standards Of Weights And Measures Act, Solvent Extracted Oil Deoiled Meal And Edible Flour Order, Export And Quality Control And Inspection Act And Other Acts And Orders.

Module II

15 Hrs

Food Safety And Standards Act 2006. Vertical Standards Vs Horizontal Standards, Food Safety Officer; Powers, Procedures, Role Of Food Analyst Most Important, International Laws; Codex Alimentarius, FDA, USDA, FAO and WHO, Other International Regulatory Bodies Like Efsa –European Food Safety Authority
Food Standards Of Australia And Newzealand ,Soudi Arabia Food Regulations

Module III

15 Hrs

Consumer Protection; Role Of Voluntary Agencies Such As, Agmark, I.S.I. Quality Control Laboratories Of Companies ,Private Testing Laboratories, Quality Control Laboratories Of Consumer Co-Operatives, Standardization Of Foods; Definition, Standards Of Quality, For Cereals, Starchy Foods, Spices And Condiments, Sweetening Agents, Meat And Meat Products, Vinegar, Sugar And Confectionary, Beverages-Alcoholic And Non Alcoholic , Carbonated Water Etc., Milk And Milk Products , Oils And Fats , Canned Foods, Fruits And Vegetables Products.

Module IV

15 Hrs

Food Additives – Classification, Nature And Characteristics And Use Of Additives In Food Such As Antioxidants, Chelating Agents, Coloring Agents, Curing Agents, Emulsions, FlavorsAndFlavor Enhancers, Flour Improvers, Humectants And Anti Caking Agents, Nutrient Supplements, Non-Nutritive Sweeteners, Ph Control Agents, Stabilizers And Thickeners. Raising Agents – Types And Their Role In Food Processing., Artificial Colors, Artificial Flavors, Consumer Education , Consumers

Problems Rights And Responsibilities, Copra 1986, Tips For Wise Purchasing, Redressal Measures How To Give Complaints And Proforma Of Complaints

References:

1. A First Course In Food Analysis – A.Y. Sathe, New Age International (P) Ltd., 1999.
2. Food Safety, Case Studies – Ramesh. V. Bhat, Nin, 1992.

Course No. 5.4
Course Code: SDC5FP26
Course Title: Quality Assurance And Certification In Food Industries
Credits: 4
Total Contact Hours: 60

Objectives

To Acquaint The Students With The Certifications Involved In Raw Material Food And Industries And Different Organizational System Such As Haccp, Gmp/Ghp And Auditing And Surveillance

Course Outcomes:

- To know about the certifications in the food industries.
- To familiar good manufacturing practices in the food industries.
- To know about the HACCP system and implementation in food industries.
- To get an idea about the importance of maintaining quality processing methods.

Syllabus Content

Module I	15 Hrs
Quality Inspection, Quality Control, Quality Management And Quality Assurance, Total Quality Management: Good Manufacturing Practices, Good Agricultural Practices, Good Laboratory Practices, Quality Management Systems Qss. Quality Circles,Sqc.	
Module II	15 Hrs
Iso System – Principles, Implementation	
Module III	15 Hrs
Haccp - Principles, Implementation, Plan Of Documentation, Types Of Records	
Module IV	15 Hrs
Auditing , Surveillance, Mock Audit, Third Party Quality Certifying Audit, Auditors And Lead Auditors, Certification, Certification Procedures, Certifying Bodies, Accrediting Bodies, International Bodies	

References:

1. Early R. 1995, Guide To Quality Management System For Food Industries, Blackie Academic
2. Krammer A & Twigg Ba . 1973 Quality Control In Food Industry Vol I, Ii, Avli Publication

Course No. 5.5
Course Code: SDC5FP27
Course Title: Food Additives And Flavours
Credits: 4
Total Contact Hours: 60 hrs

Objectives

To Understand The Importance Of Food Additives In Food Processing Technology Also To Study The Merits And Demerits Of Addition Of Food Additives.

Course outcomes

- To Get An Insight In To The Additives That Are Relevant To Food Industry
- To Gain Knowledge On Shelf Life Extension, Processing Aids And Sensory Appeal Of Additives.
- To Develop An Understanding Of Isolation Of Various Biopolymers From Food Resources And Their Relevant Applications.

Syllabus Content**Module I Introduction To Food Additives****12 Hours**

Role Of Food Additives In Food Processing, Functions -Classification -Intentional & Unintentional Food Additives. Safety Evaluation Of Food Additives, Beneficial And Toxic Effects. Food Additives - Generally Recognized As Safe (Gras), Tolerance Levels & Toxic Levels In Foods.

Module II Types Of Food Additives**12 Hours**

Preservatives, Antioxidants, Colours And Flavours (Synthetic And Natural), Sequesterants, Humectants, Hydrocolloids, Sweeteners, Acidulants, Buffering Salts, Anticaking Agents - Uses And Functions In Formulations; Indirect Food Additives.

Module III Flavour Technology**12 Hours**

Types Of Flavours, Flavours Generated During Processing - Reaction Flavours, Flavor Composites, Stability Of Flavours During Food Processing, Analysis Of Flavours, Extraction Techniques Of Flavours, Flavour Emulsions; Essential Oils And Oleoresins.

Module IV Derived Food Additives**12 Hours**

Proteins, Starches And Lipids As Functional Ingredient; Isolation, Modification, Specifications,

Functional Properties And Applications In Foods And As Nutraceuticals. Manufacturing And Applications Of Fibres From Food Sources, Fructooligosaccharides.

Module V Food Additives As Toxicants

12 Hours

Artificial Colours, Preservatives, Sweeteners; Toxicants Formed During Food Processing Such As Nitrosamines, Maillard Reaction Products Acrylamide, Benzene, Heterocyclic Amines And Aromatic Hydrocarbons; Risk Of Genetically Modified Food, Food Supplements, Persistent Organic Pollutants, Toxicity Implications Of Nanotechnology In Food.

References:

1. Titus A. M. Msagati, (2012), "The Chemistry Of Food Additives And Preservatives", John Wiley & Sons Publishers.
2. Jim Smith, Lily Hong-Shum (2011), "Food Additives Data Book", John Wiley & Sons Publishers.
3. Deshpande, S.S. (2002). "Handbook Of Food Toxicology", Marcel Dekker Publishers.

Course No. 5.6

Course Code: SDC5FP28

Course Title: Food Processing Equipments

Credits: 4

Total Contact Hours: 60 hrs

Objectives

To Provide In-Depth Knowledge In Basic Concepts Of Various Unit Operations In A Food Industry.

Course outcomes

- To Understand The Different Operations Performed In Food Industry
- To Know Details Of Working Of Different Equipments

Syllabus Content

Module I Heat Transfer In Food Processing

12 Hours

Modes Of Heat Transfer-Conduction, Convection And Radiation- Heat Exchangers- Plate Heat Exchanger-Tubular Heat-Scraped Surface Heat Exchanger.

Module II Evaporation

12 Hrs

Basic Principle, Need For Evaporation, Single Effect, Multiple Effect, Heat Economy, Type Of Evaporator-Long Tube, Short Tube, Agitated Film Evaporator.

Module III Distillation And Crystallization**12 Hrs**

Simple Distillation, Flash Distillation, Steam Distillation, Fractional Distillation Crystallisation Theory, Tank Crystallizer And Scraped Surface Crystallizer.

Module IV Extraction And Extrusion**12 Hrs**

Solid Liquid Extraction-Leaching, Liquid-Liquid Extraction, Super Critical Fluid Extraction, Single Screw Extruder, Twin Screw Extruder

Module V Mechanical Separation And Material Handling**12 Hrs**

Sedimentation, Centrifugal Separation, Filtration, Mixing, Material Handling-Belt Conveyor, Screw Conveyor, Bucket Elevator And Pneumatic Conveyor.

References:

1. Y.H.Hui, (2005), "Handbook Of Food Science, Technology And Engineering" (Vol.1-4), Marcel Dekker Publishers.
2. M.A.Rao, S.S.H.Rizvi And A.K.Dutta, (2005), "Engineering Properties Of Foods", 3rd Ed., Marcel Dekker Publishers.
3. H.Pandey, H.K. Sharma, R.C.Chouhan, B.C. Sarkar And M.C. Bera, (2004), "Experiments In Food Process Engineering", Cbs Publishers And Distributors.
4. R.P.Singh And D.R.Heldman, (2001), "Introduction To Food Engineering", 3rd Ed., Academic Press.
5. S.K.Sharma, S.J.Mulvaney And S.S.H.Rizvi, (2000), "Food Process Engineering: Theory And Laboratory Experiments", Wiley And Sons Publishers.

Course No. 5.7**Course Code: SDC5FP29(P)****Course Title: Food Adulteration (P)****Credits: 3****Total Contact Hours: 45 hrs****I. Testing Adulteration Of Milk And Products:****A) Adulteration Of Milk**

- Detergent Test
- Filter Test
- Clot On Boiling Test
- Test For Starch In Milk

II. Adulteration Of Ghee:

- Test For Vegetable Fat:
- Nitric Acid Test
- Soda Ash Test
- Analysis of Butter : Test For Dalda In Butter.
- Adulteration of Paneer: Presence Of Starch In Paneer.

III. Testing Adulteration Of Oils And Fats:

- Test For Sesame Oil In Other Oils
- Test For Added Castor Oil
- Detection of Argemone Oil In Other Oils
- Test For Rancidity In Oils

IV. Testing Adulteration Of Spices And Condiments.

- Cardamom: Extraction Of Flavour.
- Coriander Power: Test For Starch & Horse Dung Power.
- Chilli Powder. Test For Oil Soluble Dyes, Powdered Bran, Saw Dust And Brick Powder.
- Turmeric Powder: Test For Metanil Yellow And Lead Chromate Polish.
- Curry Powder: Test For Metallic Colours.
- Poppy Seeds: Test For Amaranths Seeds.
- Sajeera: Test For Sand, Stones And Other Seeds.
- Mustard Seeds: Visual Examination.
- Pepper: Test For Papaya Seeds.
- Saffron: Detection Of Maize Cob Tendrils.
- Cumin Seeds;
- Cinnamon: Plant Bark.

V. Visit to A State Food Testing Laboratory / Near Food Quality Testing Laboratory.

Course No. 5.8

Course Code: SDC5FP30(P)

Course Title: Composition And Processing Of Animal Origin Food (P- 2)

Credits: 3

Total Contact Hours: 45 hrs

Syllabus Content

- Estimation Of Moisture Content of Meat
- Preservation Of Meat By Different Methods
- Analysis Of Frozen Meat
- Estimation Of Protein Content Of Meat
- To Study Shelf-Life Of Eggs By Different Method Of Preservation
- Preparation Of Fish, Meat, And Egg Pickle
- Quality Evaluation Of Fish/Prawn
- Fish Product Formulation / Canning
- Evaluation Of Eggs For Quality Parameters (Market Egg, Branded Egg)

SEMESTER VI
Course No. 6.1
Course Code: SDC5FP31(Pr)

MAJOR INTERSHIP/MAIN PROJECT/DISSERTATION

Model Question Paper

MODEL QUESTION PAPER
Course Code: SDC1FP01
Course Title: FOOD MICROBIOLOGY

Time 2 Hours 30 Minutes 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 organisms

MODEL QUESTION PAPER
Course Code: SDC1FP02
Course Title: FOOD SCIENCE AND NUTRITION

Time: 2 Hours 30Minutes

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.

MODEL QUESTION PAPER

Course Code: SDC1FP03

Course Title: BASIC STUDY OF BAKERY AND CONFECTIONARY

Time: 2 Hours 30Minutes

Maximum mark: 80

Part A

Each carry 2 marks (max-25marks)

1. Scientific name of yeast?
2. Main ingredient used in Lozenges?
3. Gluten content of Medium hard bread wheat?
4. Sodium bicarbonate is also known as.....?
5. Naturally occurring emulsifier?
6. Serretia is produced.....appearance in bread?
7. Scientific name of sugar cane?
8. Name the proteins present in milk?
9. Rye is commonly used for the production of.....?
10. Major ingredients used for making biscuit?
11. Types of jaggery?
12. Normal yeast is also called.....?
13. 85% of the wheat kernel is consistingof.....?
14. Total Moisture content of wheat?
15. Gluten protein is rich in.....?

SECTION B

Each carry 5 marks (max. 35. Marks)

16. Manufacturing of sugar from sugar cane
17. Differentiate sponge and straight dough method
18. Toffee
19. Wheat quality
20. Chemical leavening agents
21. Classification of wheat
22. Yeast
23. Hard candy and soft candy

Section C (Essay)

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

24. Write essay on major baking ingredients and their functions
25. Discuss sugar based confectioneries.
26. Write a detailed note on biscuit production.
27. Write essay on bread making

MODEL QUESTION PAPER

Course Code: SDC1FS05

Course Title: Principles of Food Preservation

Time: 2 Hours 30Minutes

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?

MODEL QUESTION PAPER

Course Code: SDC2FP06

Course Title: FOOD CHEMISTRY

Time: 2 Hours 30Minutes

Maximum mark: 80

Part A

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

1. Distinguish Between free water and bound water?
2. Briefly explain iso-electric pH of the protein?
3. What is saponification?
4. Write short note on shortenings?
5. What is fortification?
6. Write general structure of mono, di and tri glycerides?
7. Describe the functional properties of protein?
8. What is mutarotation?
9. Who explained the structure of protein?
10. What is the unit of water activity?
11. Final product of rancidity?
12. Gelatin is obtained from where
13. Fat soluble vitamins?
14. Major component of beewax ?
15. Classification of carbohydrates

Part B

Each Carry 5 marks (Max.35 Marks)

16. Discuss various applications for enzymes in food industry?
17. Explain the role of trace minerals and supplements in human diets?
18. What is rancidity, different types and its prevention?
19. Define Maillard's reaction and its practical application in food?
20. What you mean by tenderisation of meat?
21. Explain briefly the effect of pH on enzyme reactivity?
22. Explain protein denaturation with suitable examples?
23. Discuss about naturally occurring enzyme inhibitors?

Part C

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

24. Explain types of browning reaction and recommended modes of inhibition?
25. What are antioxidants .Explain its mechanism of action in detail?
26. What are carbohydrates? Describe the classification of carbohydrates with example?
27. How do you classify lipids? Define significance of saponification value of oils and fats?

MODEL QUESTION PAPER

Course Code: SDC2FP07

Course Title: Composition & Processing of Plant Origin Foods

Time: 2 Hours 30Minutes

Maximum mark: 80

Part A

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

1. What is chilling injury?
2. Write the specification tomato sauce
3. Define maturity index of fruits
4. What is controlled atmospheric storage?
5. Write the types of browning with example
6. What is blanching?
7. What is the function of salt in pickling?
8. What is curing of rice?
9. Define aging of rice.

10. What are the role of ingredients in cake making?
11. Differentiate between cookies and biscuits.
12. What are the factors affecting cooking time of pulses?
13. Define hard candy.
14. What is staling of bread
15. 1What are the types of cake making?

Part B
Each Carry 5 marks (Max.35 Marks)

16. Write the post harvest physiological changes in fruits and vegetables
17. Describe the process of fruit cordial

18. Defferentiate freeze drying and tunnel drying.?
19. What are pectic enzymes? Discuss their importance in ripening of fruits.?
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.?

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

24. Explain the dehydration of fruits and vegetables using various drying mehods.?
25. With the help of neat flow chart explain the processing of tomato ketchup and write the defects associated with the product.
26. Explain the methods of parboiling of rice.
27. Write elaborately on milling of oats and barley.

MODEL QUESTION PAPER

Course Code: SDC3FP11

Course Title: Basic Concepts Of Beverages

Time: 2 Hours 30Minutes

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?

MODEL QUESTION PAPER

Course Code: SDC3FP12

Course Title: Food Packaging

Time: 2 Hours 30Minutes

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.

MODEL QUESTION PAPER

Course Code: SDC3FP13
Course Title: Sanitation And Hygiene

Time: 2 Hours 30Minutes

Maximum mark: 80

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

1. **What Is Potable Water?**
2. Briefly explain CIP and COP equipment?
3. What is suspended solids?
4. Write short note on membrane cleaning?

5. Sources of food contamination?
6. What is sludge?
7. Which process is used to remove dirt and sand from wastewater?
8. Explain high pressure cleaners?
9. Define sanitation?
10. Explain Antiseptics?
11. Why is sanitation important?
12. Health aspects of sanitation?
13. Explain mechanized sweepers?
14. Which process during wastewater treatment helps in killing germs?
- 15.

Part B

Each Carry 5 marks (Max.35 Marks)

16. Physical and chemical properties of sanitizers?
17. Sanitation equipments used in food industry?
18. Explain sanitation programme and quality assurance?
19. Explain BOD and COD?
20. Brief note on food handling and personal hygiene?
21. Explain biofilm?
22. Chemical and physical characteristics of detergents?
23. Explain sanitation regulation and standards?

Part C

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

24. Waste water treatment and disposal?
25. Explain sanitation ? Application of sanitation in food industry?
26. Explain insect and pest control?
27. What is hygiene monitoring test? Explain environmental sanitation?

MODEL QUESTION PAPER

Course Code: SDC4FP17

**Course Title: COMPOSITION AND PROCESSING OF ANIMAL
ORIGIN FOODS**

Time: 2 Hours 30Minutes

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

MODEL QUESTION PAPER

Course Code: SDC4FP18

Course Title: Instrumental Analysis Of Food

Time: 2 Hours 30Minutes

Maximum mark: 80

Section A (Short answers) **Each question carries 2 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 caliberation and standardisation of different instruments

MODEL QUESTION PAPER

Course Code: SDC4FP19

Course Title: Food Toxicology

Time: 2 Hours 30Minutes

Maximum mark: 80

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
13. What is toxicology?
14. Toxic compounds in shellfish?
15. Health effects in toxic compounds?

SECTION B

Each carry 5 marks (max. 30. Marks)

16. What is microbial toxicity and and explain
17. Toxicology of effects heavy metals
18. What is derived toxins and explain
19. Explain briefly about acrylamide
- 20.. Explain briefly about auto oxidative product
21. General principles of food toxicology
22. Methods used in safety evaluation.
23. Chemical effects on fumigants

Section C (Essay)

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

24. Explain about intentional and unintentional additives in food
25. Explain about algal mushroom, mushroom, marine toxicants
26. Explain microbial toxicity with examples?
27. Write an essay on food toxicology?

MODEL QUESTION PAPER

Course Code: SDC5FP24

Course Title: Byproduct Utilization And Waste Management

Time: 2 Hours 30Minutes

Maximum mark: 80

Section A (Short answers)

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

1. Define waste?
2. Define waste from agricultural field?
3. Write an example of industrial waste?
4. Write any 2 example of waste from food industries?
5. Name any 2 byproduct from meat industries
6. Example of solid waste
7. Example of liquid waste
8. Name the waste from oil industry
9. Environmental protection act starts in?
10. Expand ISWM
11. Write an example of E waste?
12. Expand BOD
13. Expand COD
14. Expand TDS
15. Expand ETP

Section B (Paragraph)

Each Carry 5 marks (Max.35 Marks)

1. Differentiate avoidable and unavoidable waste with suitable examples?
2. Differentiate preconsumer and post consumer waste
3. Write short essay on waste from meat industry
4. Write short note on waste from milk industries
5. Differentiate waste from oil industry and fruit and vegetable industries
6. Write short note on food industrial waste
7. Write short essay on how to prevent food loss or food wastage?
8. Write essay on ideal waste management system?

Section C (Essay)

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

1. Write essay on effluent treatment?
2. Write essay on byproduct utilization?
3. Differentiate the utilization of waste from agro industries and animal industries?
4. Write essay on waste management?

MODEL QUESTION PAPER

Course Code: SDC5FP27

Course Title: Food Additives And Flavours

Time: 2 Hours 30Minutes

Maximum mark: 80

Section A (Short answers)

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

1. A substance intentionally added that preserves the flavor and improve taste is called.....
2. Expand GRAS
3. E number of riboflavin
4. What is annatto
5. E102 is the E number of.....
6. The green color in plants responsible for the presence of.....
7. Carotenoid is present in
8. The color of betanine
9. Name the organism which produces nisin.
10. The enzyme lysozyme present in.....
11. Parabens are active at pH.....
12. Name the Carcinogenic compound produced by the use of nitrites
13. What is water activity
14. Name any two chemical preservatives
15. Name the pigment present in turmeric

Section B (Paragraph)

Each Carry 5 marks (Max.35 Marks)

16. Write short note on food additives.
17. Role of food additives in food.
18. List out the functions of food additives.
19. Classify food preservatives.
20. Differentiate intentional and incidental food additives.
21. Differentiate class I and class II preservatives.
22. Explain salt and sugar as a preservative.
23. Nitrates and nitrites as a preservative.

Section C (Essay)

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

24. Write essay on food additives.
25. Explain food preservatives, antioxidants and food coloring agents.
26. "All food additives are carcinogenic" justify your answer.
27. Describe genetically modified foods: Safety, Risks and Public concern.

MODEL QUESTION PAPER

Course Code: SDC5FP25

Course Title: Food Adulteration

Time: 2 Hours 30Minutes

Maximum mark: 80

Part A

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

1. Added sugar in milk is considered as ?
2. Why are adulterants added?
3. Adulterant used in coffee powder?
4. Expand PFA??
5. Adulterant used for honey?
6. Example of biological hazard?
7. Methods for detection of common adulterants?
8. Uses of additives in food?
9. Write two thickening agents used in food?
10. Which stage does adulteration take place in?
11. Types of food additives?
12. What are sequestrants ?
13. Examples for stabilizers?
14. Define food adulteration?
15. Antioxidants used in food?

Part B

Each Carry 5 marks (Max.35 Marks)

16. Explain the adulteration through food additives?
17. Define adulteration with example?
18. Additives and sweetening agents in food?
19. Explain food safety and standards authority of india?
20. Intentional and incidental adulteration?
21. Detection of adulteration in milk?
22. Explain standardization of foods with suitable examples?
23. Explain anti caking agents?

Part C

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

24. Write an essay on the common foods which are subjected to adulteration and explain the types poisonous substances added for food adulteration?
25. Describe the highlights of food safety and standard act?
26. Explain the testing and standardized testing methods and protocols?
27. Write in detail about the general impact of food adulteration on human health?