



UNIVERSITY OF CALICUT

Abstract

General and Academic - B.Voc Programme in Food Science under modified B.Voc Regulations 2014 - Scheme and Syllabus - Approved - Implemented w.e.f 2018 Admissions - Orders issued.

G & A - IV - J

U.O.No. 15632/2019/Admn

Dated, Calicut University.P.O, 05.11.2019

*Read:-*1. U.O.No. 7404/2018/Admn dated 19.06.2018

2. Item No.1 in the minutes of the B.Voc Regulations Committee held on 13.09.2018
3. Item No.II in the minutes of the meeting of the Board of Studies in Food Technology held on 23.10.2018
4. Letter No.414/B.Voc.PRC/3-19 from the Principal, Pazhassi Raja College, Wayanad dated 20.03.2019
5. Remarks from the Chairperson, Board of Studies in Food Technology dated 08.05.2019
6. Remarks from the Dean, Faculty of Science dated 27.05.2019
7. Item No.I.21 in the Minutes of LXXX Academic Council held on 05.10.2019.

ORDER

The modified B.Voc Regulations has been implemented vide paper read as (1) and vide paper read as (2), the B.Voc Regulations Committee decided to place the syllabi of new B.Voc Programmes which are sanctioned by UGC, in various colleges under University of Calicut, before various Boards of Studies for approval.

The Board of Studies in Food Technology vide paper read as (3) considered the matter of approval of B.Voc programme in Food Science of Pazhassi Raja College, Wayanad and recommended to change some content of the syllabus. The Principal has forwarded the corrected syllabus of B.Voc Programme in Food Science as vide paper read as (4).

The Chairperson, Board of Studies in Food Technology has examined the syllabus of B.Voc Food Science and recommended to approve the same vide paper read as (5). The Faculty of Science vide paper read as (6) and the Academic Council vide paper read as (7) approved the same. The Vice Chancellor has accorded sanction to implement the Academic Council decision.

Sanction has therefore been accorded for implementing the Scheme and Syllabus of B.Voc Programme in Food Science under modified B.Voc Regulations 2014, in the University w.e.f 2018 admissions.

Orders are issued accordingly.(Syllabus appended)

Biju George K

Assistant Registrar

To

Principals of the Colleges offering BVoc Programme in Food Science
Copy to: PS TO VC/PA to R/PA TO CE/JCE VII/JCE 1/GA I F/Library/SF/DF/FC

Forwarded / By Order

Section Officer

UNIVERSITY OF CALICUT

Curriculum for B. Voc. Programme in FOOD SCIENCE

2018-19

UGC Sponsored B. Voc. Programmes

The University Grants Commission (UGC) had launched a scheme for skills development based higher education as part of college/university education, leading to Bachelor of Vocation (B.Voc.) degree with multiple entry and exit points. The B.Voc. programme is focused on universities and colleges providing undergraduate studies which would also incorporate specific job roles along with general education. This would enable the graduates completing B.Voc to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge.

PROGRAMME OBJECTIVES

The B. Voc courses are designed with the following objectives,

- 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

GENERAL PROGRAMME STRUCTURE

The B. Voc Programme is designed to bridge the potential skill gap identified. The curriculum in each of the years of the programme would be a suitable mix of general education and skill development components.

GENERAL EDUCATION COMPONENTS

- a) The general education component provides emphasis to Communication skill, Presentation skill, Health and Safety, Industrial Psychology, Environmental awareness, Entrepreneurship development and other relevant subjects in the field.
- b) An option for additional language should be provided which enhances the employability outside the state.
- c) General Education Components should not exceed 40% of the curriculum

- d All B.Voc Programme should follow the General education component pattern listed below (Common English Courses and Additional language courses of LRP programmes of CUCBCSSUG 2014)

No	Semester	Course No	Course Code	Paper
1	1	1.1	GEC1EG01	A(01) –Transaction-essential English language skills
2	1	1.2	GEC1ML02	MAL1A01(2) Malayalam-
				Bhashayum Sahithyavum-I
			GEC1HD02	A (07)- Communication Skills in Hindi
3	2	2.1	GEC2EG04	A(02) – Ways with the words- Literatures in English
4	2	2.2	GEC2ML05	MAL2A02(2)- Malayalam-
			GEC2HD05	A(09)- Literature in Hindi
5	3	3.1	GEC3EG07	A(03)-Writing for academic and professional success
6	4	4.1	GEC4EG10	A(04)- Zeit-geist: Reading on contemporary culture

SKILL DEVELOPMENT COMPONENTS:

- This component should match the skill gap identified.
- At least 50% of Skill Development Component should be allotted to practical and can grow up to 60% based on the nature of the course. The practical component can be carried out in the college and/or the industry partner premises.

LEVELS OF AWARDS

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

. Awards	Duration
Diploma	2 Semester
Advanced Diploma	4 Semester
B. Voc Degree	6 Semester

- Students are free to exit at any point in the duration of the programme.

2. Only those students who successfully complete the courses and clear the examination are eligible for the certificate.
3. Separate certificate will be awarded for each year for successful candidates.
4. 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.
5. B. Voc degree will confer to those who successfully complete the diploma, higher diploma and internship.

CONDITIONS FOR ADMISSIONS

ELIGIBILITY

- The admission to B Voc programme will be as per the rules and regulations of the University for UG admissions.
- Basic eligibility for B.Voc is 10+2 and above in any stream (No age limit)
- The eligibility criteria for admission shall be as announced by the University from time to time.
- Separate rank lists shall be drawn up for reserved seats as per the existing rules.
- Grace Marks may be awarded to a student for meritorious achievements in co-curricular activities such as Sports/Arts/ NSS/NCC/ Student Entrepreneurship.
- Preferred subjects and index mark calculations will be decided by the respective Board of Studies.

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 of the college/ B. Voc consortium.

RESERVATION/QUOTA

A maximum of 50 students can be admitted to one B. Voc programme. The students can be admitted only to the first semester (except for diploma holders). No students are admitted directly to the Third and Fifth semester in any circumstance except for diploma holders. Diploma holders may be permitted to third semester directly as mentioned above.

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

FEES STRUCTURE

1. The course fee and examination fee for the first three years will be decided by the University.

2. The college can collect Caution deposit, PTA fund, special fees, university fees, sports fee etc according to the norms provided by the university at the time of admission.
3. After third year, with the consent of university/UGC, the college can conduct the same programme in self-financing mode (provided UGC not granting further funds). The course fee and examination fee (Regular/ improvement/ supplementary) structure in self financing mode will be decided by the University.

REGISTRATION/RE-REGISTRATION

Every candidate should register for all subjects of the Semester-End examinations of each semester. A candidate who does not register will not be permitted to attend the Semester-End examinations; he/she shall not be permitted to attend the next semester. A candidate shall be eligible to register for any higher semester, if he/she has satisfactorily completed the course of study and registered for the examination. He/she should register for the semester at the start of the semester before the stipulated date. University will notify the starting and closing dates for each semester.

RE-JOINING THE PROGRAMME

1. Rejoining the course will be allowed to only if the candidate has secured a minimum CGPA of 2.5.
2. The candidate should remit the fees prevailing that time.
3. B. Voc governing council will take the decision regarding the rejoining.

COURSE CALENDAR

The B. Voc programme conducted by the affiliated institutions follows a separate calendar from the conversional degree/ PG programme. The programme is distributed over six semesters and each semester constitute 90 working days inclusive of examination.

Note: Within a week after the commencement of classes of each semester, Head of each Institution should forward the list of students, details of faculty members allotted from the college and from industry partners along with their qualification and year of experience, to the University. Also, Head of each Institution shall ensure the availability of sufficient number of faculty members having experience and qualifications in the institution.

ASSESSMENT OF STUDENTS

Assessment of students for each subject will be done by internal continuous assessment and Semester- End examinations. This dual mode assessment will be applicable to both Theory and Practical courses except for internship and project. Total marks in theory course reflect 80 marks external and 20 marks internal assessments. The mark division for practical courses are 20 marks internal and 80 marks external. For internship and project, there is no internal assessment. (Except for Broadcasting and Journalism, annexure attached).

SI No	Courses	Internal	External
1	Theory	20	80
2.	Practical	20	80
3.	Internship/Project	0	100

INTERNAL

Internal assessment shall be conducted throughout the semester. It shall be based on internal examinations, assignments (such as homework, problem solving, group discussions, quiz, literature survey, seminar, team project, software exercises, etc.) as decided by the faculty handling the course, and regularity in the class. Assignments of every semester shall preferably be submitted in Assignment Book, which is a bound book similar to laboratory record. The mark distribution to award internal continuous assessment marks for theory subject should be as follows:

Assessment	Mark
Test papers (minimum two, best two out of three is preferred)	10
Assignments (minimum two) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.	5
Regularity in the class	5

The mark distribution to award internal continuous assessment marks for practical subject should be as follows:

Assessment Type	Mark
Evaluation in the lab and Rough Record	10
End-semester Test	4
Viva	1
Regularity	5

Note:

1. No candidate will be permitted to attend the end-semester practical examination unless he/she produces certified record of the laboratory.
2. Full credit for regularity in the class can be given only if the candidate has secured minimum 90% attendance in the subject. Attendance evaluation for each course is as follows

Attendance	Marks
90% and Above	5

85 to 89.9%	4
80 to 84.9%	3
76 to 79.9%	2
75 to 75.9 %	1

External

- Semester- End examinations for theory and practical courses will be conducted by the University. There shall be University examinations at the end of each semester for both theory and practical. Failed or improvement candidates will have to appear for the Semester- End examinations along with regular students.
- At the starting of each semester, Colleges should prepare question bank (containing maximum questions from each module of various types mentioned) for the external theory/practical examinations for all courses during that semester and will be sent to the university. University will prepare the question papers and answer keys for each course and will sent back to the college for conducting the examination.
- University will appoint a Chairman for each B.Voc Programme. Chairman will monitor the University Practical Examinations and Evaluation of Theory and Practical papers.
- For the evaluation of theory papers, Chairman should form a team consisting of a chief and required additional Examiners for each course.
- At the starting of each semester, Colleges should prepare a panel of External examiners for conducting Practical examinations. Chairman/University will appoint examiners from the panel proposed by colleges.
- Practical Examinations can be conducted and evaluated from the college or the industry partner premises. The team for conducting and evaluating practical exams should include an examiner appointed from the approved panel of faculties, and an internal examiner.
- Head of Institution/ Chief of Examination of the college should take necessary steps to prevent any malpractices in the Semester-End examinations. If any such instances are detected, they should be reported to the University without any delay.
- University will be issuing mark list, provisional/original certificates to the candidates.

INTERNSHIP AND PROJECT

Internship and the major 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. The Evaluation process follows 100% external assessment.

1. There will be internship/project at the end of 2nd and 4th semesters and an internship for the whole sixth semester.

2. 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.
3. The student has to make regular discussions with the guide while choosing the subject/area and throughout the life time of the project.
4. At least three reviews should be conducted to evaluate the progress of work.
5. An evaluation team is constituted for conducting the evaluation. The team consist of external examiner, allotted by the university from the approved examination panel, representative from the industry and a faculty.
6. Students should submit a report of their work. A valid certificate from the organization should be produced as a proof that the work is carried out in the respective organization.
7. Students are required to demonstrate the working model of their work (if possible) to the panel of examiners. A viva will be conducted based on the report and students are supposed to clarify the queries regarding their work.
8. Mark distribution for internship assessment

Distribution	Marks
Content and relevance of Dissertation	60
Viva	20
Presentation	20

MINIMUM FOR PASS

The successful completion of all the courses prescribed for the diploma/degree programme with E grade (40 %) 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.
2. A student who does not secure this pass marks in a subject will have to repeat the respective subject.
3. If a candidate has passed all examinations of B.Voc. Course (at the time of publication of results of last semester) except project/internship 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.

IMPROVEMENT/SUPPLEMENTARY

Candidates shall be allowed to improve the grade of any two theory courses in a semester. This can be done only in the immediate subsequent chance. If the candidate gets more than 10% mark variations in the improvement chance, marks scored in the improvement chance will be considered for grading of the course; otherwise marks scored in the first attempt will be retained. No candidate shall be permitted to improve the marks scored in practical examinations and internal continuous assessment.

ATTENDANCE

A candidate shall be permitted to appear for the Semester-End examinations only if he/she satisfies the following requirements:

- (a) He/she must secure not less than 75% attendance in the total number of working hours in each semester.
- (b) He/she must earn a progress certificate from the head of the institution stating that he/she has satisfactorily completed the course of study prescribed in the semester as required by these regulations.
- (c) His/her conduct must be satisfactory

It shall be open to the Vice Chancellor to grant condonation of shortage of attendance on the recommendation of the head of the institution in accordance with the following norms.

- The shortage shall not be more than 10%
- Shortage up to 20% shall be condoned once during the entire course provided such shortage is caused by continuous absence on genuine medical grounds.
- Shortage shall not be condoned more than twice during the entire course.

Candidate who is not eligible for condonation of shortage of attendance shall repeat the semester as per university norms.

PATTERN OF QUESTION PAPERS

The question papers of Semester-End examinations of theory subjects shall be able to perform achievement testing of the students in an effective manner. The question paper shall be prepared

- (a) Covering all sections of the course syllabus and total marks from each module should be approximately same.
- (b) Unambiguous and free from any defects/errors
- (c) Emphasizing knowledge testing, problem solving & quantitative methods
- (d) Containing adequate data/other information on the problems assigned (e) having clear and complete instructions to the candidates.

Duration of Semester-End examinations will be 3 hours. The pattern of questions for theory subjects shall be as follows

Section	Total No Of Questions	No of Questions to be Answered	Marks for each Question	Total Marks
A:Very Short/ Objective answer questions	10	10	1	10
B: Short answer questions	12	8	2	16
C: Short Essays	9	6	4	24
D: Essays	4	2	15	30
Total				80

And for practicals

Marks Distribution	Total Marks
Theory/ Algorithm/Flow diagram	20
Implementation	30
Result/Output	10
Record	10
Viva	10
Total	80

CREDIT SYSTEM

Each subject shall have a certain number of credits assigned to it depending upon the academic load and the nature and importance of the subject. The credit associated with each subject will be shown in the prescribed scheme and syllabi. Each course shall have an integer number of credits, which reflects its weightage.

- a) One Credit would mean equivalent of 15 periods of 60 minutes each, for theory, workshops/IT and tutorials;
- b) For internship/field work, the credit weightage for equivalent hours shall be 50% of that for lectures/workshops;
- c) For self-learning, based on e-content or otherwise, the credit weightage for equivalent hours of study should be 50% or less of that for lectures/workshops.

INDIRECT GRADING SYSTEM

- Indirect Grading System based on a 7 -point scale is used to evaluate the performance of students.
- Each course is evaluated by assigning marks with a letter grade (A+, A, B, C, D, E or F) to that course by the method of indirect grading.
- An aggregate of E grade with 40 % of marks (after external and internal put together) is required in each course for a pass and also for awarding a degree/diploma.

- Appearance for Internal Assessment and End Semester Evaluation are compulsory and no grade shall be awarded to a candidate if she/he is absent for Internal Assessment / End Semester Evaluation or both.
- For a pass in each course 40% marks or E grade is necessary.
- A 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.
- SGPA of the student in that semester is calculated using the formula

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

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

$$\text{CGPA} = \frac{\text{Total credit points obtained in six semesters}}{\text{Total credits acquired (180)}}$$

Total credits acquired (180)

- SGPA and CGPA shall be rounded off to two decimal places. CGPA determines the broad academic level of the student in a programme and is the index for ranking students (in terms of grade points).
- An overall letter grade (Cumulative Grade) for the entire programme shall be awarded to a student depending on her/his CGPA

Marks scored	Grade	Remarks
90 and Above	A+	Outstanding
80 to 89	A	Excellent
70 to 79	B	Very Good
60 to 69	C	Good
50 to 59	D	Satisfactory
40 to 49	E	Adequate
Below 40	F	Failure

GRADE CARDS

The University shall issue to the students grade/marks card (by online) on completion of each semester, which shall contain the following information:

- Name of University
- Title of B.Voc Programme
- Semester concerned
- Name and Register Number of student
- Code number, Title and Credits of each course opted in the semester
- Internal marks, External marks, total marks, Grade point (G) and Letter grade in each course in the semester
- The total credits, total credit points and SGPA in the semester (corrected to two decimal places)

Percentage of total marks The final Grade/mark Card issued at the end of the final semester shall contain the details of all courses taken during the entire programme including those taken over and above the prescribed minimum credits for obtaining the degree. However, as already mentioned, for the computation of CGPA only the best performed courses with maximum grade points alone shall be taken subject to the minimum credits requirements (180) for passing a specific degree. The final grade card shall show the percentage of marks, CGPA (corrected to two decimal places) and the overall letter grade of a student for the entire programme. The final grade/mark card shall also include the grade points and letter grade of general course and skill developmental courses separately. This is to be done in a seven point indirect scale.

MONITORING CELLS/COMMITTEES

EXAMINATION MONITORING CELL

Head of the each institution should formulate an Examination Monitoring Cell at the institution for conducting and supervising all examinations including the internal examinations. The structure and their collective responsibilities will be as per the university norms.

GRIEVANCE CELL

Each college should setup a Grievance Cell with at least four faculty members to look into grievances of the students, if any.

ANTI-RAGGING CELL

Head of Institution shall take necessary steps to constitute anti-ragging committee and squad at the commencement of each academic year. The committee and the squad shall take effective steps as specified by the Honorable Supreme Court of India, to prevent ragging.

CLASS COMMITTEE

Head of institution shall take necessary steps to form a class committee for each class at the start of classes of each semester. This class committee shall be in existence for the semester concerned. The class committee shall consist of the Head of Department, Staff Advisor of the class, a senior faculty member of the department, a faculty member from another department, and three student representatives (one of them should be a girl).

There should be at least two meetings of the class committee every semester; it shall be the responsibility of the Head of Department to convene these meetings. The decisions of the Class Committee shall be recorded in a register for further reference. Each class committee will communicate its recommendations to the Head of Institution.

The responsibilities of the class committee are:

- a) To review periodically the progress and conduct of students in the class.
- b) To discuss any problems concerning any courses in the semester concerned.
- c) To identify weaker students of the class and suggest remedial measures.
- d) To review teaching effectiveness and coverage of syllabus.

Discuss any other issue related to the students of the class

COLLEGE TRANSFER

College transfer is not allowed in any circumstances.

B.Voc degree is equal to any degree approved by University of Calicut

TRANSITORY PROVISION

Notwithstanding anything contained in these regulations, the Vice-Chancellor has the power to provide by order that these regulations shall be applied to any program with such necessary modification.

B. Voc. FOOD SCIENCE

Food science involves a combination of procedures to achieve the intend changes to the raw materials. These are conveniently categorized as unit operations, each of which has a specific, identifiable and predictable effect on a food. Unit operations are grouped

together to form a process. The combination and sequence of operations determines the nature of the final product.

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

Cumulative credits awarded to the learners in this programme

NSQF Level	Skill Component Credits	General Education Credits	Total Credits for Award	Normal Duration	Exit Points/Awards
4	18	12	30	6 Months	Certificate
5	36	24	60	1 Year	Diploma
6	72	48	120	2 Years	Advanced Diploma
7	124	56	180	3 Years	B. Voc Degree

Job Roles proposed to be covered in each year (Along with NSQF level) for B. Voc. Food Science

Duration	NSQF level	QP Codes and Job roles	Alignment details with NSDC
6 Months	4	<p>Qualification Pack: Baking Technician</p> <p>Job Roles: A baking technician/ operative is responsible for baking of products, maintaining their consistency and quality, while meeting defines SOPs and leveraging his/ her skill to</p>	<p>Reference ID: FIC/Q5005</p>

		<p>operate ovens in synchronization with proof box/ rest of the plant or unit.</p> <p>Qualification Pack: Plant biscuit production specialist</p> <p>Job Roles: A plant biscuit production specialist produces biscuits in industrial units as per defines SOPs in synchronization with rest of the plant/ unit by weighing, mixing, kneading, rolling, heating, cutting, moulding, baking, cooling etc. either manually or using machineries following the defines SOPs of the plant/ unit.</p> <p>Qualification Pack: Plant baker</p> <p>Job Roles: A plant baker produces or supervises the production of baked products (breads, biscuits, cakes etc.) in industrial unit by weighing, mixing, kneading, fermenting, shaping, rolling, sheeting, cutting, moulding, baking, cooling etc. using various industrial equipments.</p> <p>Qualification Pack: Mixing technician</p> <p>Job Roles: A mixing technician prepares different types of dough used in baking baked products by using various methods such as weighing, mixing, kneading, fermenting following the defined Sops of the plant or unit while maintaining food safety and hygiene in the work environment.</p>	<p>Reference ID: FIC/Q5005</p> <p>Reference ID: FIC/ Q5001</p> <p>Reference ID: FIC/ Q5004</p>
1 Year	5	<p>Qualification pack: Dairy Products Processor:</p> <p>Job Roles: A dairy products processor is responsible for processing milk to produce various types of dairy products. He / she is responsible for carrying out processes such as homogenizing, pasteurizing, cooling, mixing, curdling, foaming, cutting churning, fermenting, freezing, condensing, drying and flavouring of milk.</p>	<p>Reference ID : FIC/ Q2001</p>

		<p>Qualification Pack: Ice Cream Processing Technician</p> <p>Job Roles: A Ice Cream Processing Technician is responsible for producing ice cream by operating various ice cream processing machineries. He or she is responsible for homogenizing, pasteurizing, freezing, cutting, hardening, storing, filling and packing following the specifications and standards of the organization.</p> <p>Qualification Pack: Food Products Packaging Technician</p> <p>Job Roles: A Food Products Packaging Technician performs various packaging functions and handles all categories of packaging such as primary, secondary and tertiary packaging for food products.</p>	<p>Reference ID: FIC/Q2004</p> <p>Reference ID: FIC/Q7001</p>
2 Years	6	<p>Qualifications Pack- Food Analyst</p> <p>Job Roles: The person is responsible for chemical and microbiological analysis of food items.</p> <p>Qualifications Pack- Fish and Sea food Processing Technician</p> <p>Job Roles: A fish and seafood processing technician is responsible for processing fish and sea foods to achieve quality and quantity of products along with maintain food safety and hygiene in work environment.</p> <p>Qualifications Pack- Spice Processing Technician</p> <p>Job Roles: Responsible for processing, reconditioning, post processing treatments etc of various spice items.</p>	<p>Not Aligned</p> <p>Reference ID: FIC/ Q4001</p> <p>Not Aligned</p>

		<p>Qualifications Pack- Technical Assistant in Beverage industry</p> <p>Job Roles: provide technical support for the production of beverages. Quality maintenance of the products. Packaging of beverages.</p> <p>Qualifications Pack- Grain Mill Operator</p> <p>Job Roles: A grain mill operator carries out processes such as cleaning, destoning, hulling, polishing and grinding to produce milled grains and flour(s).</p> <p>Qualifications Pack- Chief Miller</p> <p>Job Roles: A chief miller manages a milling process for all types of grains overseeing activities such as handling of various milling machineries, maintenance of process parameters, inspection of raw materials and finished goods to achieve the desired quality and quality of products.</p>	<p>Not Aligned</p> <p>Reference ID: FIC/Q1003</p> <p>Reference ID: FIC/Q1001</p>
3 Years	7	<p>Qualifications Pack- Fruit and vegetable selection in -charge</p> <p>Job Roles: A fruit and vegetable selection in-charge is responsible for sorting and grading produce such as fruits, vegetables, nuts etc. based on their colour, size, appearance, feel and smell.</p> <p>Qualifications Pack- Jam/Jelly/ Ketchup Processing Technician</p> <p>Job Roles: A jam, jelly, ketchup operating technician is responsible for processing fruits and vegetables to make jam/ jelly and ketchup by receiving, checking raw material quality, sorting, pulping, pasteurizing, cooking, juice extracting,</p>	<p>Reference ID: FIC/Q0108</p> <p>Reference ID: FIC/Q0103</p>

		<p>clarifying, filtering, sampling for quality analysis, cooling, packing and storing.</p> <p>Qualifications Pack- Pickle making Technician</p> <p>Job Roles: A pickle making technician is responsible for preparation of all types of pickles from various fruits and vegetables through the process of washing, peeling, cutting, slicing, curing, brining, blending, filling, oil topping, packing and storage.</p> <p>Qualifications Pack- Assistant Lab Technician – Food and Agricultural Commodities</p> <p>Job Roles: An Assistant Lab Technician – Food and Agricultural Commodities is responsible for ensuring quality products through sampling of raw materials, packaging material, finished products and shelf life samples for quantitative and qualitative analysis.</p>	<p>Reference ID: FIC/Q0102</p> <p>Reference ID: FIC/Q7006</p>
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B. Voc in Food Science Syllabus Outline

C. No.	Course code	Course title	Hours/ week	Credits	Marks		
					Internal	External	Total
Semester I							
1.1	GEC1EG01	English (A01)-Transaction-essential English language skills (Common Paper for UG Programmes-Adopted from Calicut University Syllabus)	4	4	20	80	100
1.2	GEC1ML02 GEC1HN02	Communication Skill in Languages other than English (A07(3)) (Common Paper for UG Programmes-Adopted from Calicut University Syllabus)	4	4	20	80	100
1.3	GEC1IT03	IT FOR BUSINESS & MANAGEMENT (BBIIC02) (Adopted from BACHELOR OF BUSINESS ADMINISTRATION syllabus - Complementary course -CU- 2014)	4	4	20	80	100
1.4	SDC1FS01	Bakery and Confectionery Technology	4	5	20	80	100
1.5	SDC1FS02(P)	Bakery and Confectionery Technology (Practical)	5	5	20	80	100
1.6	SDC1FS03	Principles of Food Preservation	4	4	20	80	100
1.7	SDC1FS04	Food Science and Nutrition	5	4	20	80	100
Total			30	30			700
Semester II							
2.1	GEC2EG04	English A(02) – Ways with the words- Literatures in English (Common Paper for UG Programmes-Adopted from Calicut University Syllabus)	4	4	20	80	100

2.2	GEC2ML05 GEC2HN05	Communication Skill in Languages other than English (A09)- Malayalam/Hindi (Common Paper for UG Programmes- Adopted from Calicut University Syllabus)	4	4	20	80	100
2.3	GEC2FM06	Food Microbiology –I (FT2 B 03) (Adopted from B.Sc. Food technology Syllabus-CU CBCSS UG 2014)	4	4	20	80	100
2.4	SDC2FS05	Dairy Technology	4	4	20	80	100
2.5	SDC2FS06(P)	Dairy Technology practical	5	5	20	80	100
2.6	SDC2FS07	Packaging Technology	4	4	20	80	100
2.7	SDC2FSI-1	Internship/Project		5	20	80	100
Total			30	30			700
Semester III							
3.1	GEC3EG07	English A(03)-Writing for academic and professional success (Common Paper for UG Programmes- Adopted from Calicut University Syllabus)	4	4	20	80	100
3.2	GEC3NS08	Basic Numerical Skills (A11) (Common Paper for UG Programmes- Adopted from Calicut University Syllabus)	4	4	20	80	100
3.3	GEC3FM09	Food Microbiology II (FT5 B 09) (Adopted from B.Sc. Food technology Syllabus-CU CBCSS UG 2014)	4	4	20	80	100
3.4	SDC2FS08 (P)	Chemical and Microbial Analysis of Foods (Practical)	5	5	20	80	100
3.5	SDC3FS09	Technology of Fish, Meat and Egg Processing	5	5	20	80	100
3.6	SDC3FS10	Technology of Spices and Plantation Crops	4	4	20	80	100
3.7	SDC3FS11	Food Additives and Flavour Technology	4	4	20	80	100
Total			30	30			700
Semester IV							
4.1	GEC4EG10	English A(04)- Zeit-geist: Reading on contemporary culture	4	4	20	80	100

		(Common Paper for UG Programmes- Adopted from Calicut University Syllabus)					
4.2	GEC4HR11	Human resource management (2..4 BCH) (Adopted from B.Com Syllabus, Calicut University, 2017-18 Admission)	4	4	20	80	100
4.3	GEC4FN12	Food Chemistry and Nutrition (FT4 B 07) (Adopted from B.Sc. Food technology Syllabus-CU CBCSS UG 2014)	4	4	20	80	100
4.4	SDC4FS12	Technology of Cereals, Pulses and Oilseeds	4	4	20	80	100
4.5	SDC4FS13(P)	Technology of Cereals, Pulses and Oilseeds (Practical)	5	5	20	80	100
4.6	SDC4FS14	Technology of Beverages	4	4	20	80	100
4.7	SDC4FSI-2	Internship/Project		5	20	80	100
Total			30	30			700
Semester V							
5.1	GEC5FE13	Food Engineering (FT6 B O1 E) (Adopted from B.Sc. Food technology Syllabus-CU CBCSS UG 2014)	4	4	20	80	100
5.2	GEC5ED14	Entrepreneurship Development (BC4A13) (Adopted from B.Com Syllabus, Calicut University, 2017-18 Admission).	4	4	20	80	100
5.3	SDC5FS15	Processing of Fruits and Vegetables	4	4	20	80	100
5.4	SDC5FS16(P)	Processing of Fruits and Vegetables (Practical)	6	6	20	80	100
5.5	SDC5FS17	Food Laws and Regulations	4	4	20	80	100
5.6	SDC5FS18	Unit Operations in Food Industry	4	4	20	80	100
5.7	SDC5FS19	Byproduct utilization and Waste management	4	4	20	80	100
Total			30	30			700
Semester VI							
6.1	SDC6FSPr-1	Major Internship/Main Project/Dissertation		30			100
Total				30			100

B. Voc Programme in Food Science

Detailed Syllabus

SEMESTER I

Course No. 1.4

Course Code: SDC1FS01

Course Title: Bakery and Confectionery Technology

Credits: 5

Total Contact Hrs: 75 Hrs

Aim of the course: To impart basic and applied technology of baking and confectionery and acquaint with the manufacturing technology of bakery and confectionery products.

Course Overview and Context

- 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

15 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

15 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

15 Hours

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

15 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

15 Hours

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

Learning Resources

Reference books:

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. 1.5

Course Code: SDC1FS02(P)

Course Title: Bakery and Confectionery Technology-Practical

Credits: 5

Total Contact Hrs: 75 Hrs

Aim of the course: To develop professional and practical knowledge in bakery and Confectionary and make them competent as an entrepreneur.

Course Overview and Context

- 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.

Course No. 1.6
Course Code: SDC1FS03
Course Title: Principles of Food Preservation
Credits: 4
Total Contact Hrs: 60 Hrs

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

Course Overview and Context

- 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.

Learning Resources

Reference Books

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. 1.7

Course Code: SDC1FS04

Course Title: Food Science and Nutrition

Credits: 4

Total Contact Hrs: 60 Hrs

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

Course Overview and Context

- 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.

Learning Resources**Reference Books**

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.

SEMESTER II

Course No. 2.4**Course Code: SDC2FS05****Course Title: Dairy Technology****Credits: 4****Total Contact Hrs: 60 Hrs**

Aim of the course: To inculcate the knowledge regarding various dairy products and its processing techniques.

Course Overview and Context

- To understand about the products that can be made from milk.
- To understand the processing and storage of dairy products.
- To know about the quality control measures applied in dairy industries.
- To have a basic idea about their processing and products which can be made at a small scale

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

Milk - Definition, sources, and composition of milk, factors effecting composition of milk, physiochemical properties of milk, grading of milk-definition and types of grades, collection and transportation of milk.

Module II: Processing of market milk**12 Hours**

Flowchart of milk processing, Reception, Different types of cooling systems. Clarification and filtration process, standardization- Pearson's square method, pasteurization-LTLT, HTST and UHT process- continuous pasteuriser, Sterilisation and Homogenisation, Cream separation- centrifugal cream separator, bactofugation.

Module III: Special milks

12 Hours

Skim milk, evaporated milk, condensed milk, standardized milk, toned milk, double toned milk, flavoured milk, reconstituted milk.

Module IV: Indigenous and Fermented milk products

12 Hours

Product description, methods for manufacture of butter, cheese, ice cream, khoa, channa, paneer, shrikhand, ghee. Spray drying system: dried milk- whole milk and skim milk powder. Instantization of milk.

Module V: In-Plant cleaning system

12 Hours

Introduction to Cleaning in- place (CIP) system - cleaning procedure, Cleaning efficiency, Methods of cleaning in food industry, cleaning solutions – Detergents, Sanitizers. SIP system of dairy plant, Personal hygiene in dairy plant.

Learning Resources

References

1. Joshi.V.K., (2015), "Indigenous Fermented Foods of South Asia", CRC Press.
 2. Alan H. Varnam, (2012), "Milk and Milk Products: Technology, chemistry and microbiology", Springer Science & Business Media Publishers.
 3. Robinson, R. K., (2012), "Modern Dairy Technology: Volume 2 Advances in Milk Products", Springer Science & Business Media Publishers.
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Course No. 2.5

Course Code: SDC2FS06(P)

Course Title: Dairy Technology-Practical

Credits: 5

Total Contact Hrs: 75 Hrs

Aim of the course: To develop the skills in dairy product preparation and to familiarise with the dairy plant equipments.

Course Overview and Context

- 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

1. Milk Testing - Platform Tests.
 2. Determination of Activity (Titrable Acidity) of Milk.
 3. Determination of fat and SNF content in milk.
 4. Clot on boiling test for milk.
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5. Determination of specific gravity of milk.
6. Detection of Addition of Starch in Milk.
7. Preparation of Lassi.
8. Preparation of khoa.
9. Preparation of Basundi.
10. Preparation of chakka and shrikand.
11. Preparation of kalakand.
12. Preparation of cooking butter.
13. Preparation of ghee.
14. Preparation of flavoured milk.
15. Visit to milk product development centre.

Course No. 2.6
Course Code: SDC2FS07
Course Title: Packaging Technology
Credits: 4
Total Contact Hrs: 60 Hrs

Aim of the course: To provide knowledge about trends and development in food packaging technologies and materials.

Course Overview and Context

- 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).

Learning Resources

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. 2.7

Course Code: SDC2FSI-1

Course Title: Internship/Project

Credits: 5

Duration: 2 Weeks

Aim of the Course: To familiarize with the various practices in the industry.

Overview of the Course: The student has to be part of the industry for atleast two weeks. The duration of stay in the industry could be extended by the mutual understanding of the industry and student. The internship should support the student to get a hands –on expertise in the fields concerned. On successful completion a certificate has to be submitted indicating the period of internship and the skills acquired. At the end of the internship a detailed report regarding the internship must be produced for evaluation. There will be viva voce in connection with the particular industry where the internship completed.

Alternatively the student can perform an internal project in a relevant topic through faculty guidance either internally or externally. The project may be done throughout the semester and on successful completion the work will be evaluated.

SEMESTER III

Course No. 3.4

Course Code: SDC3FS08 (P)

Course Title: Chemical and Microbial Analysis of Foods (Practical)

Credits: 5

Total Contact Hours: 75

Aim of the course: To analyse the chemical constituents in food and to understand the basic concepts of food microbiology.

Course Overview and Context

- To analyze 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
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Course No. 3.5

Course Code: SDC3FS09

Course Title: Technology of Fish, Meat and Egg Processing

Credits: 5

Total Contact Hours: 75

Aim of the course: To understand the technology for handling, processing, preservation of meat, poultry and fish products.

Course Overview and Context

- To understand need and importance of livestock, egg and poultry industry
- To study structure, composition and nutritional quality of animal products.
- To study processing and preservation of animal foods.
- To understand technology behind preparation of various animal food products and by product utilization

Syllabus Content

Module I: Fish **15 Hours**

Fish - Classification of fish (fresh water and marine), composition, spoilage of fish - microbiological, physiological, biochemical

Preservation of fish-Chilling, Freezing, curing, drying, salting - salting methods: brining, pickling, curing and canning of fish. Smoking - smoke production, smoke components, quality, safety and nutritive value of smoked fish, pre – smoking processes, smoking process control. QC of fish TVN, FFA, PV, Nitrate and nitrite in cured meat.

Module II: Meat **15 Hours**

Meat - Definition of carcass, concept of red meat and white meat, composition of meat, marbling in meat, post mortem changes in meat - rigor mortis, tenderization of meat, ageing of meat

Meat Quality - colour, flavour, texture, Water Holding Capacity (WHC), Emulsification capacity of meat. **Preservation of meat** -Refrigeration and freezing, thermal processing - canning of meat, dehydration, meat curing.

Module I11: Egg **10 Hours**

Egg-composition and nutritive value, egg proteins, characteristics of fresh egg, deterioration of egg quality.

Egg-Composition and nutritive value. Factors affecting egg quality. Preservation of eggs - Refrigeration and freezing, thermal processing, dehydration, coating.

Module 1V: Products from fish, meat and egg **15 Hours**

Fishery products: Surimi - Process, traditional and modern production lines, quality of surimi products. Fish protein concentrates (FPC), fish protein extracts (FPE). **Meat products:** Sausages - processing, RTE meat products. **Egg products**– Egg powder, frozen egg pulp, designer eggs.

Learning Resources

Reference

1. George M. Hall (2012), “Fish Processing Technology”, Springer Science & Business Media Publication.
2. Fidel Toldra (2010), “Handbook of Meat Processing”, John Wiley & Sons Publication.
3. Rao D.G. (2010), “Fundamentals of food engineering”. PHI Learning Pvt. Ltd.

4. Isabel Guerrero-Legarreta (2010), "Handbook of Poultry Science and Technology, Secondary Processing", John Wiley and Sons Publication.
 5. Casey M. Owens. (2010), "Poultry Meat Processing", Second Edition, CRC Press.
 6. Leo M.L. Nollet and Fidel Toldra (2006), "Advanced Technologies For Meat Processing", CRC Press.
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Course No. 3.6
Course Code: SDC3FS10
Course Title: Technology of Spices and Plantation Crops
Credits: 4
Total Contact Hours: 60

Aim of the course: To impart basic knowledge about the importance and production technology of spices and plantation crops.

Course Overview and Context

- 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: Spice processing

15 Hours

Introduction, classification, composition and functions. Major international quality specifications of spices. Spice processing, spice reconditioning, spice grinding, post-processing treatments. Introduction to Gas chromatography, HPLC, AAS, Spectrophotometer.

Module II: Processing of Major Spices and plantation

15 Hours

Major spices: Pepper, cardamom, ginger, clove, nutmeg, vanilla, cinnamon, chilli and turmeric – method of manufacture; chemistry of the volatiles; enzymatic synthesis of flavour identical.

Module III: Spice extractives

15 Hours

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.

Module IV: Plantation crops- cashew processing

15 Hours

Composition, Structure and characteristics of cashew nut, uses, Traditional method of cashew processing, General processing, Cashew apple processing , cashew by product - CNSL.

Course No. 3.7

Course Code: SDC3FS11

Course Title: Food Additives and Flavour Technology

Credits: 4

Total Contact Hours: 60

Aim of the course: To understand the importance of food additives in food processing technology also to study the merits and demerits of addition of food additives.

Course Overview and Context

- 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), sequestrants, 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.

Learning Resources

Reference Books

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.

SEMESTER IV

Course No. 4.4

Course Code: SDC4FS12

Course Title: Technology of Cereals, Pulses and Oilseeds

Credits: 4

Total Contact Hours: 60

Aim of the course: To acquaint with production and consumption trends, structure, composition, quality evaluation, and processing technologies for product development and value addition of various cereals, pulses and oilseeds.

Course Overview and Context

- 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.

Syllabus Content

Module I : Paddy Processing

12 Hours

Composition and Quality characteristics. 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.

Module II: Rice Milling

12 Hours

Paddy Dehusking Processes. Rice Mill Flow Chart. Engelberg Huller Mills. 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.

Module III: Wheat milling

12 Hours

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

Module IV: Milling of Pulses

12 Hours

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

Module V: Oil seed processing

12 Hours

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.

Learning Resources

References

1. Dendy DAV & Dobraszczyk BJ. (2001), “Cereal and Cereal Products”, Aspen Publications.
2. Chakraverty, A. (1995), “Post Harvest Technology of Cereals, Pulses and Oilseeds”. Oxford and IBH Publishing Co, Calcutta
3. N.L.Kent and A.D.Evans: (1994) “Technology of Cereals” (4th Edition), Elsevier Science (Pergaman), Oxford, UK,
4. Samuel Matz: (1992), “The Chemistry and Technology of Cereals as Food and Feed, Chapman & Hall

Course No. 4.5

Course Code: SDC4FS13(P)

Course Title: Technology of Cereals, Pulses and Oilseeds-Practical

Credits: 5

Total Contact Hours: 75

Course Overview and Context:

- 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. Estimation of Polanski Value of flour.
 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.
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Course No. 4.6

Course Code: SDC4FS14

Course Title: Technology of Beverages

Credits: 4

Total Contact Hours: 60

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

Course Overview and Context

- 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, low-calorie 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.

Learning Resources

Reference Books

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.
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Course No. 4.7
Course Code: SDC4FSI-2
Course Title: Internship/Project
Credits: 5
Duration: Two weeks

Aim of the Course: To familiarize with the various practices in the industry.

Overview of the Course: The student has to be part of the industry for at least two weeks. The duration of stay in the industry could be extended by the mutual understanding of the industry and student. The internship should support the student to get a hands –on expertise in the fields concerned. On successful completion a certificate has to be submitted indicating the period of internship and the skills acquired. At the end of the internship a detailed report regarding the internship must be produced for evaluation. There will be viva voce in connection with the particular industry where the internship completed.

Alternatively the student can perform an internal project in a relevant topic through faculty guidance either internally or externally. The project may be done throughout the semester and on successful completion the work will be evaluated.

SEMESTER V

Course No. 5.3
Course Code: SDC5FS15
Course Title: Processing of Fruits and Vegetables
Credits: 4
Total Contact Hours: 60

Aim of the course: To understand about the proper post harvest handling technologies of fruits and vegetables and to know the process of development of fruit and vegetable processing products.

Course Overview and Context

- 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

Syllabus Content

Module I: Introduction

12 Hours

Composition and nutritive value of fruits and vegetable. Factors effecting 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

Module II: Spoilage of fruits and vegetables

12 Hours

Different types of spoilages in fruits and vegetables. Spoilage during storage of fruits and vegetables and their prevention. General methods of preservation of whole fruits/vegetables and processed fruits and vegetables. Spoilage of pickles. Methods of preparation, curing techniques, defects and remedies. Types of preservatives commonly used in Fruits and vegetables processing industry, limits of usage of preservatives.

Module III: Processing of fruits and vegetables

12 Hours

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

Module IV: Manufacture of Fruit products

12 Hours

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

Module V: Manufacture of vegetable products

12 Hours

Manufacturing process of sauce, ketchup, vegetable juices and concentrated products

Learning Resources

Reference Books

1. Nirmal Sinha, 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.

Course No. 5.4

Course Code: SDC5FS16(P)

Course Title: Processing of Fruits and Vegetables-Practical

Credits: 6

Total Contact Hours: 90

Aim of the course: 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 Overview and Context

- To understand the Handling and operating of food processing equipments 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 pretreatment 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 vegetable products.
2. Estimation of benzoic acid, sulphur dioxide and KMS in terms of ppm present in fruits and vegetable products.
3. Estimation of reducing and non reducing sugars in fruit and vegetable products
4. 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.
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Course No. 5.5
Course Code: SDC5FS17
Course Title: Food Laws and Regulations
Credits: 4
Total Contact Hours: 60

Aim of the Course: To acquaint with food quality parameters and control systems, food standards, regulations, specifications.

Syllabus Content

UNIT I

3 Hrs

Introduction and Need of enforcing to Food Laws.

UNIT 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.

UNIT 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.

UNIT 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.

UNIT V

5 lectures

Recommended international code of hygiene for various products.

Reference Books

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, II. AVI Publ
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Course No. 5.6

Course Code: SDC5FS18

Course Title: Unit Operations in Food Industry

Credits: 4

Total Contact Hours: 60

Aim of the course: To provide in-depth knowledge in basic concepts of various unit operations in a food industry.

Course Overview and Context

- To understand the different operations performed in food industry
- To know details of working of different equipments

Course Outline

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 Hours

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 Hours

Simple distillation, flash distillation, steam distillation, fractional distillation Crystallisation - theory, tank crystallizer and scraped surface crystallizer.

Module IV: Extraction and extrusion

12 Hours

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 Hours

Sedimentation, Centrifugal separation, filtration, Mixing, Material handling-Belt conveyor, Screw Conveyor, bucket elevator and pneumatic conveyor.

Learning Resources

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.
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Course No. 5.7

Course Code: SDC5FS19

Course Title: Byproduct utilization and Waste management

Credits: 4

Total Contact Hours: 60

Aim of the course: 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 Overview and Context

- 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

Learning Resources**Reference**

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.

SEMESTER VI

Course No. 6.1**Course Code: SDC6FSPR-1****Course Title: Major Internship/Main Project/Dissertation****Credits: 30**

Details of Project Work/Internship

Industrial training will be conducted at the industrial premises engaged in food production, processing and allied activities. A group of students (5-6 number) will be allotted to each industry. The interest of the students will be one of the major criteria in selecting the category of industry. A project report of the industrial training shall be submitted at the end of sixth semester and a viva-voce will be conducted by a panel of three subject experts.

GENERAL COURSES

Course No. 1.3**Course Code: GEC1IT03****Course Title: IT FOR BUSINESS & MANAGEMENT****Credits: 4****Total Contact Hrs: 60 Hrs**

Course Objectives:

1. To familiarize the students with the use of IT for business and management
2. To make them proficient in using computer for routine tasks like data retrieval, data analysis, accounting and report generation.

Module I

10 Hours

Introduction to IT: meaning and nature-importance-applications in business and management office automation – objectives – office automation technologies –office equipments virtual office-office communication methods: tele, audio and video conferencing and telepresence system.

Module II

10 Hours

Microsoft Office – components- Word processing - characteristics of word processing – MS Word for word processing – creating, formatting and printing documents in MS Word – inserting objects from other MS applications – mail merge- Microsoft PowerPoint – creating presentations in PowerPoint- applying templates – recording narration – presenting animation – inserting hyperlink – inserting slide number, date and time – inserting picture into slide – slide transition – running slide show.

Module III

10 Hours

Spreadsheet-features-advantages-packages-Ms Excel: creating, formatting and printing worksheets- functions in Excel- mathematical: SUM, PRODUCT, SQRT, ROMAN and ROUND statistical: AVERAGE, MEDIAN, MODE, STDEV, CORREL and FORECAST, Financial: DB, SLN, SYD, PMT, NPER, and IPMT- Database: DMAX, DMIN, DAVERAGE, DCOUNT and DSUM- goal seek-scenario management.

Module IV

15 Hours

Database system– characteristics of database system- DBMS- components – relational database system - Database administrator – functions of database administrator – database security - Microsoft Access – creation of database in MS Access – designing and running tables and queries in Access, types of queries- , Creating forms – report generation in MS Access – creating report in design view - creating report using Wizard –formatting and printing of report.

Module V

15 Hours

The Internet – Internet protocol suite – domain name system – Internet and its possibilities for business communication – Internet tools –email, FTP, WWW, bulletin boards, telnet-

portals – search engines – website– intranet and extranet- Electronic Data Interchange- objectives and advantages of EDI- EDI formats- business applications of EDI.

(Note: About half of the hours may be used for practical sessions to demonstrate the use of MS Office applications such as Word, Excel, Access and PowerPoint. A few sessions may also be used for web browsing and email communications).

Books:

1. Management Information Systems, Kenneth C. Laudon and Jane P. Laudon, Pearson Education, New Delhi, 2002.
2. Using Microsoft Office, Ed Bott and Woody Leonhard, Prentice Hall of India, New Delhi 1999.
3. Fundamental of Database Systems, Elmasri and Navathe, Addison Wesley, New Delhi.

Course No. 2.3

Course Code: GEC2FM06

Course Title: Food Microbiology – I

Credits: 4

Total Contact Hrs: 60 Hrs

Module I Microscopy (15 hrs)

Microscopy: Light microscope – Bright field, Dark field, Electron microscope– Transmission Electron microscope, Scanning electron microscope Resolving power, Limits of resolution, Refractive index, Magnification, Parts of microscope

Module II: Evolution of Microorganisms in foods (15 hrs)

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

Module III Microorganisms important in foods (30 hrs)

Bacteria :Structure, Morphology, Physical condition required for growth, growth curve,Reproduction - Transformation, Transduction and Conjugation Nutritional requirements- Types of bacteria, Phototrophs, Chemotrophs, Autotrophs, Hectrotrophs

Fungi: Morphology, Classification, Phycomycetes, Ascomycetes, Basidiomycetes, Deutromycetes
Reproduction-Sexual and Asexual

Virus Classification, Composition, Morphology, Replication of virus

Yeasts Structure, Morphology, Reproduction – Budding

Course No. 3.2
Course Code: GEC3NS08
Course Title: BASIC NUMERICAL SKILLS
Credits: 4
Total Contact Hours: 60

Objectives:

- To enable the students to acquire knowledge of Mathematics and Statistics.
- At the end of this course, the students should have understood set operations, matrix and Mathematics of finance, Statistical tools and their applications.

Module I

Sets and Set Operation - Venn Diagrams - Elements of Co-ordinate system - Matrices -Fundamental ideas about matrices and their operational rules - Matrix multiplication - Inversion of square matrices of not more than 3rd order - Solving system of simultaneous linear equations.

10 Hours

Module II

Theory of Equations : Meaning - types of equations - Simple linear and Simultaneous equations (only two variables) eliminations and substitution method only - Quadratic equation factorization and formula method ($ax^2 + bx + c = 0$ form only) - Problems on business applications.

10 Hours

Module III

Progressions : Arithmetic Progressions - Finding the 'n'th term of an AP and also sum to 'n' terms of an AP - Insertion of Arithmetic means in given terms of AP and representation of AP - Geometric Progression : Finding 'n'th term of GP - Insertion of GMs in given GP and also representation of GP - Mathematics of Finance - Simple and compound interest (Simple problems only).

10 Hours

Module IV

Meaning and Definition of Statistics - Scope and limitations - Statistical enquiries -Scope of the problem - Methods to be employed - Types of enquiries - Presentation of data by Diagrammatic and Graphical Method - Formation of Frequency Distribution.

15 Hours

Module V

Measures of Central Tendency - Arithmetic Mean - Median - Mode - Geometric and Harmonic Mean - Measures of variation and standard, mean and quartile deviations -Skewness and Kurtosis - Lorenz curve.

Analysis of Time Series: Methods of measuring - Trend and Seasonal variations - Index number - Unweighted indices - Consumer price and cost of living indices.

15 Hour

(Theory and problems may be in the ratio of 20% and 80% respectively. An over view of the topics is expected and only simple problems shall be given)

Reference Books:

1. Sundaresan and Jayaseelan - An Introduction to Business Mathematics and Statistical Methods.
2. Dr. A K Arte & R V Prabhakar - A Text Book of Business Mathematics.
3. Sanchethi and Kapoor- Business Mathematics.
4. Gupta S.P- Statistical Methods
5. Navaneethan P- Business Mathematics
6. R.S.N. Pillai, Mrs. Bhagavathi - Statistics
7. P.R. Vittal - Business Mathematics and Statistics.

Course No. 3.3
Course Code: GEC3FM09
Course Title: Food Microbiology II
Credits: 4
Total Contact Hours: 60

Module I

Culture media and isolation of pure culture (10 hrs)

Culture Media: Bacteriological Media - Selective, Differential, Enrichment Media

Methods of isolating Pure culture Serial dilution, Pour plate, streak plate, stroke Culture

Module II

Control of Microorganism (10hrs)

Control of Microorganism Physical agents – high temperature, low temperature desiccation, osmotic pressure radiation, filtration, Chemical agents-Characteristics of an ideal antimicrobial chemical agent, Alcohols, Aldehydes, Dyes, Halogens, Phenols, Acids, Alkalis, Gases

Module III

Food spoilage (10 hrs)

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

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

Module IV

Microbial intoxications & Infections (10 hrs)

Intoxications & Infections Definition, Exotoxin, Endotoxin, intoxications and infections - sources, symptoms Methods of Prevention and investigation of food borne disease out- break.

Module V

Microbes in fermented foods (10 hrs)

Microbes in fermented foods Fermented vegetable products, Sauer Kraut, pickles, soy sauces, idli
Fermented dairy products - Cheese, yoghurt

Module VI

Water & Milk testing g (5 hrs)

Water & Milk testing Microbiological testing of water & milk

Module VII

Food sanitation (5 hrs)

Food sanitation Importance of personal hygiene, habits clothes, illness, education of food handles in handing & serving food

Course No. 4.2
Course Code: GEC4HR11
Course Title: Human Resources Management
Credits: 4
Total Contact Hours: 60

Objectives:

> To familiarize the students with the different aspects of managing human resources in a organization. >
To equip the students with basic knowledge and skills required for the acquisition, development and retention of human resources.

Module I

Introduction to Human Resource Management—Importance--scope and objectives of HRM. Evolution of the concept of HRM- Approaches to HRM- Personal management Vs Human Resource Management-HRM and competitive advantage- Traditional Vs Strategic human resource management.

10 Hours

Module II

Human resource planning, Recruitment and selection—Job analysis---process of job analysis-job discretion- job specification-- methods of job analysis-- Conventional Vs strategic planning—job evaluation—Recruitment--source of recruitment-methods.

10 Hours

Module III

Placement, Induction and Internal mobility of human resource. Training of employees—need for training-objectives- approaches --methods-training environment- areas of training- Training evaluation.

10 Hours

Module IV

Performance appraisal and career planning. Need and importance- objectives process- methods and problems of performance appraisal- . Concept of career planning –features- methods –uses career development.

15 Hours

Module V

Compensation management and grievance redressal. Compensation planning objectives- Wage systems-factors influencing wage system-. Grievance redressal procedure-discipline- approaches-punishment-essentials of a good discipline system. Labour participation in management.

15 Hours

References:

1. Human Resource Management- Text and Cases-- VSP Rao
2. Human Resource Management – Pravin Durai 2. Human Resource Management—Snell, Bohlander
3. Personal Management and Human Resources—Venkata Ratnam .Srivasthava
4. A Hand Book of Personnel Management Practice—Dale Yolder

Course No. 4.3

Course Code: GEC4FN12

Course Title: Food Chemistry and Nutrition

Credits: 4

Total Contact Hours: 60

Module 1

Carbohydrates, Proteins, Lipids

(20 hrs)

Carbohydrates: Classification and properties Monosaccharides: Glucose, Fructose; Oligosaccharides: Maltose, Lactose, Sucrose; Polysaccharides: Starch, Cellulose, Gums, Pectin Proteins: Amino acids, Classification of protein, Structure of protein, Denaturation, Qualitative analysis of protein, Protein estimation-Kjeldahl's method Lipids: Classification, Fatty acids: Saturated, Unsaturated, Polyunsaturated fatty acids, Rancidity, Hydrogenation, Refining of fats & oils

Module II

Pigments Colloids and Enzymes

(20 hrs)

Pigments: Chlorophyll, Flavanoids, Anthocyanins, Anthoxanthins Colloids Colloidal chemistry, Properties of solutions, Sols & Suspensions, Food colloids, Emulsion, Types, Emulsifying Agents Enzymes Enzymatic and non enzymatic reactions during storage, enzymes in food industry

Module III

concept of Nutrition

(20 hrs)

Concept of Nutrition Definition of terms Nutrition, Under nutrition, Mal nutrition and balanced diet, Basic food groups, Digestion and absorption of basic nutrients Energy: Definition of calorie & Joule Measurement of calorific value of food Basic nutrients: Source, requirements and deficiencies of carbohydrates, lipids, Protein, Evaluation of protein quality, supplementation Vitamins & Minerals: Classification, sources, function, requirements and deficiency

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Course No. 5.1
Course Code: GEC5FE13
Course Title: Food Engineering
Credits: 4
Total Contact Hours: 60

Module I

Unit operations & Heat transfer

(15 hrs)

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

Module II

Heat exchanger

(15 hrs)

Classification, contact type heat exchange - Immersion, Non-contact type heat exchanger, Plate Heat exchanger, Scraped surface Heat exchanger, Tubular Heat exchanger, Double & Triple tube

Heat exchanger, Shell & Tube Heat exchanger Pasteurization HTST, UHT, Pasteurizing equipments

Module III

Refrigeration & Freezing (15 hrs)

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

Module IV

Evaporation (15 hrs)

Principle, single effect evaporation, multiple effect evaporation, Types of evaporators - Horizontal tube, Vertical tube, Falling film evaporator, Raising film evaporator.

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Course No. 5.2
Course Code: GEC5ED14
Course Title: Entrepreneurship Development
Credits: 4
Total Contact Hours: 60

Objectives:

- > To familiarize the students with the concept of entrepreneurship.
- > To identify and develop the entrepreneurial talents of the students.
- > To generate innovative business ideas in the emerging industrial scenario.

Module I

Entrepreneur and Fundamentals of Entrepreneurship: Entrepreneurial competencies -Factors affecting entrepreneurial growth - Role of entrepreneur in economic development -Challenges of women entrepreneurs.

15 Hours

Module II

Micro, Small and Medium Enterprises: Legal Framework - Licenses - Role of promotional institutions with special reference to KINFRA , KITCO , MSME & DICs - Concessions - Incentives and subsidies.

15 Hours

Module III

Project Management: Feasibility and Viability Analysis-Technical - Financial - Network -Appraisal and evaluation - Project Report preparation.

15 Hours

Module IV

Identification of Business Opportunities in the Context of Kerala: Rate of ED Clubs -Industrial Policies - Skill development for entrepreneurs - Business Incubation : Meaning - Setting up of Business Incubation Centres.

15 Hours

Reference Books:

1. S.S. Kanka , Entrepreneurial Development, Sultan Chand.
 2. PrasannaChandra , Project Planning, Analysis, Selection, Implementation and Review, Tata McGraw Hill.
 3. VasanthaDesai , Dynamics of Entrepreneurial Development, Himalaya.
 4. C.B.Gupta& N.P. Sreenivasan , Entrepreneurial Development, Sultan Chand.
 5. Nirmal K Gupta, Small Industry-Challenges and Perspectives, Anmol Publications.
 6. Vasantha Desai, Small scale Industries and Entrepreneurship, Himalaya.
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FIRST SEMESTER B VOC EXAMINATION, FEBRUARY 2019
(CUCBCSS-UG)
FOOD SCIENCE
SDC1FS01: BAKERY AND CONFECTIONERY TECHNOLOGY

Part A

Answer all the following
Each question carries 1mark

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.....?
16. Scientific name of dicocum wheat?
17. Red wheat is commonly used for the production of.....?
18. Biproducts of anaerobic fermentation?
19. Name the enzyme responsible for fermentation?
20. Name 2 chemical leavening agent?
21. Name the enzyme which increases the amount of amylase level in the flour?

22. Ropiness is due to the presence of.....?
23. Beet sugar is produced from?
24. Gluten content of soft bread wheat?
25. List out the different types of yeast?
26. Name the 4th skin of bran?
27. Ash content of wheat?
28. Medium hard bread wheat is suitable for the production of.....?
29. Whole wheat is good source of.....vitamin?
30. The name biscuit is derived from the Latin word.....?
31. The main function of fat used in biscuit?
32.is commonly used as substitute of sugar?
33. Sugar present in milk?
34. Expand SMBS?
35. Expand MSG?
36. Baking temperature of biscuit?
37. Annatto is responsible for the production of.....?
38. Name the good source of beta carotene?
39. Precursor of vitamin A?
40. Name the 2nd wheat consumer in the world?

*Answer all the following
Write briefly on.
Each question carries 2 marks*

1. Ropiness
2. Bread staling
3. Chemical composition of wheat

4. Lozenges
5. Aerobic and anaerobic fermentation of yeast
6. Caramel
7. Instant yeast
8. Fat used in biscuit
9. Jaggery
10. Durum wheat
11. Emulsifiers
12. Normal yeast
13. How to prevent the spoilages in bread
14. Draw and label the structure of wheat
15. Soft bread wheat
16. Processing factors
17. Composition of starch, protein, fat in bran, endosperm and germ
18. Protein present in wheat
19. Define baking
20. Water is used as an ingredient in baking
21. Potassium bicarbonate
22. Fungal alpha amylase
23. List out the natural color and their sources
24. Advantages of sponge and straight dough method
25. Aflatoxin
26. Differentiate hard and soft biscuit
27. Events during baking
28. Fat is used as an ingredient in baking

29. Write down the main difference between aatta flour and Maida
30. List out the different layers of bran
31. Vitamins present in wheat
32. List out synthetic and natural food colors
33. Fungal alpha amylase
34. Ammonium bicarbonate as a leavening agent?
35. Caramalization

Part C (Short Essay Type Questions)

Answer any six of the following

Each question carries 4 marks.

1. Manufacturing of sugar from sugar cane
2. Differentiate sponge and straight dough method
3. Toffee
4. Wheat quality
5. Chemical leavening agents
6. Classification of wheat
7. Yeast
8. Hard candy and soft candy
9. Structure and composition of wheat
10. Differentiate durum wheat and dicoccum wheat
11. Flour is used as an ingredient in baking
12. Natural and artificial color
13. Differentiate moldiness and ropiness
14. Spoilage of cake and biscuit
15. Lemon drop
16. Caramel and toffee
17. Differentiate raw sugar and refined sugar
18. Describe Moulding and proofing
19. Differentiate chemical and natural leavening agent

20. Classification of flour
21. Draw the flow chart of biscuit production
22. Classification of biscuit dough on the basis of mixing
23. Physical and chemical changes during baking
24. Write down different cereals used for the production of flour
25. Shaping of biscuit
26. Physical criteria of wheat
27. Chemical and natural leavening agents
28. Differentiate semi sweet dough and short dough
29. White sugar and khandasari sugar
30. Detail on fudge

Part D (Essay Type Questions)

Answer any two of the following

Each question carries 15 marks

1. Write essay on major baking ingredients and their functions
2. Discuss sugar based confectioneries.
3. Write a detailed note on biscuit production.
4. Write essay on bread making
5. Discuss wheat and their classifications
6. Draw a flow chart of bread production and explain the various steps involved it
7. Write essay on “importance of flour as an ingredient in baking”
8. Detail on sugar production and the products obtained from sugar cane
9. Draw the flow chart of biscuit production and explain the various steps involved it
10. Write essay on chemical preservatives used in food

**FIRST SEMESTER B VocDEGREE EXAMINATION
(CUCBCSS-UG)
B.Voc. FOOD SCIENCE
SDC1FS03-PRINCIPLES OF FOOD PRESERVATION**

Part A

*Answer all the following
Each question carries 1 mark*

1. PH range of low acid foods?
2. Name the 3 types of defects occur in cans?
3. Expand the terms given below
a) BHA b)BHT
4. Name any fumigant commonly used for fumigation?
5. Write down the major difference between drying and dehydration?
6. Due to high surface temperature and unbalanced drying, dry skin will form and causes -----?
7. Name any chemical used for gaseous sterilization?
8. Name the organism which produces Nisin?
9. Give an example of fermented pickling?
10. Smoking is combined with either roasting or baking is called-----?
11. Name the organism which causes Q fever?
12. Pressure range of HPP?
13. Name the Organism which causes spoilage in canned foods?
14. Give an example of gram negative bacteria?
15. Expand FSSAI?
16. Expand HACCP?
17. Name any synthetic food color?
18. E number of curcumin?

19. Expand HPP?
20. Time temperature pressure range of Autoclave?
21. Choose the Water activity of bacteria
a) 0.98 b) 0.96 c) 0.91 d) 0.87
22. Define the term hermetically sealed containers?
23. Orange colour in carrot is responsible for the presence of?
24. Father of canning?
25. Cold sterilization is also known as?
26. Explain what is pasteurization?
27. Temp range of HTST?
28. E number of chlorophyll?
29. Canning is also known as?
30. Name any fermented food product?
31. Name a Commercially available dried fruit?
32. Father of pasteurization?
33. Wood is used for smoking?
34. Name any example of smoke roasting?
35. Carcinogenic compound produced during smoking?
36. List out the different types of tastes?
37. Expand RARS?
38. Expand WHO?
39. Stages of UHT?
40. Describe the term “blanching”?
41. Write equipment used for vacuum packaging?
42. What are the two types of pickling?

43. Sauerkraut is a fermented food made from.....?
44. Name an example of mesophilic bacteria?
45. Smoke house temperature for cold smoking is typically done between..... to?
46. Name the bacteria which resist high salt concentration?
47. E number of Anthocyanins?
48. In modified atmosphere storage the removed oxygen is usually replaced by.....?
49. Give two low acid foods?
50. Define “smoking”?

Part B

Answer all the following

Write briefly on.

Each question carries 2 marks

1. Importance of Food Preservation
2. Lysozyme
3. Chlorophyll
4. Osmosis
5. Moist Heat Sterilization
6. Freezing
7. Concentrated Foods
8. Mechanism of Spoilage
9. Pseudo Yeast
10. Thermophilic Bacteria
11. Water activity
12. Curcumin
13. Saffron

14. Dry heat sterilization
15. Mesophilic bacteria
16. Production of a concentrated food
17. Flippers
18. LTLT
19. Define food preservation
20. Oxidation
21. Carotenoids
22. UHT
23. Tartrazine
24. E numbering
25. Enzymatic spoilage
26. Mechanical spoilage
27. Microwave preservation
28. Curing
29. Sugaring
30. Quick freezing
31. Blanching
32. Fumigation
33. Case hardening
34. Cabinet drier
35. Describe Radicidation, Radurization and Radaappertization
36. Disinfection
37. Classification of food?
38. Advantages of canning

39. Define natural antioxidants with examples?
40. Lysozyme?
41. Psychrophiles?
42. Thermophiles?
43. Exhausting
44. Containers used for canning
45. Mechanical method of sterilization

Part C (Short Essay Type Questions)

Answer any six of the following

Each question carries 4 marks.

1. Pasteurization
2. Canning
3. Types of Spoilage
4. Shelf life study
5. Smoking
6. Modified atmospheric packaging
7. Advantages and Disadvantages of Irradiation
8. Different types of Drying
9. Fermentation
10. HPP
11. Irradiation
12. Importance of food preservation
13. Freezing
14. Refrigeration
15. Difference between freezing and refrigeration
16. Types of drying

17. Concentration
18. Class 1 food additives
19. Class 2 food additives
20. Biological spoilage
21. Sterilization
22. Principles of food preservation
23. Concept of food science
24. Describe the flowchart of canning
25. Advantages of refrigeration
26. Modern methods of preservation
27. Pulse Electric field
28. Types of bacteria
29. Spoilage in canned food
30. HTST
31. Describe additives and that are essential for food?
32. Draw the flow chart of drying
33. Pre and post dehydration treatments
34. Factors affecting dehydration
35. Chemical methods of sterilization
36. Functions of gases used in MAP
37. Differentiate artificial and natural colors used in food
38. Differentiate drying and curing
39. Importance of food additives
40. Intrinsic and extrinsic factors of shelf life study

Part D (Essay Type Questions)

Answer any two of the following

Each question carries 15 marks

1. Give an account of Food preservation methods.
2. Discuss preservation by using High temperature.
3. Write a detailed note on Food spoilage.
4. Preservation by using low temperature
5. Preservation by removal of moisture

6. Write essay on food additives
7. Detailed note on pasteurization and canning
8. Differentiate drying and dehydration methods?
9. All the preservatives are suited for human health? Describe your opinion on food preservatives used in food?
10. Differentiate nonthermal and thermal preservation methods?
11. Write essay on modern methods of preservation?
12. Explain traditional methods of food preservation?
13. Differentiate class1 and class2 preservatives?

B.Voc Food Science - Semester I

SDC1FS04-FOOD SCIENCE AND NUTRITION

One Mark Questions

1. Deficiency of Vit D in children?
2. Precursor of Vit A?
3. Which mineral is involved in the strengthening of teeth?
4. Hypokalemia is due to?
5. Vitamin responsible for the night vision?
6. Which mineral is most abundantly available in the human body?
7. Give 2 examples of extruded foods?
8. What is the main source of chlorine?
9. Give 2 examples of GM foods?
10. Deficiency of iodine?
11. What are the 2 main classifications of minerals?
12. What is the daily requirement of potassium?
13. Name the different types of vitamins
14. Main sources of fat soluble vitamin?
15. Night blindness is caused by the deficiency of.....?
16. Vitamin E is also called.....?
17. Molydenosis is caused by the excess consumption of?
18. Excessive iron in body causes.....?
19. The amount of iron present in healthy adults?
20. Normal concentration of chloride in serum is?
21. Cobalamine is also termed as.....?
22. Pantothenic acid is amide between And?

23. Biotin is composed of
24. Riboflavin belongs to a yellow fluorescent pigment called.....?
25. Vitamine K2 is termed as
26. The most important chemical property of vitamin E?
27. Expand GM foods?
28. Give an example of organic food?
29. Unit of energy?
30. Expand BMR?
31. The total amount of zinc in adult body?
32. Name the protein present in milk?
33. The total body content of manganese?
34. Rich sources of iron?
35. Expand WHO?
36. Vitamin B6 is also called?
37. Expand FMN?
38. Wheat germ oil is rich in?
39. The main source of Sulphur?
40. Ca deficiency inChildren's?
41. What is Nutraceuticals?
42. Differentiate Mal – Nutrition and Over - Nutrition.
43. How will you convert calorie to joule?
44. Differentiate Micro and Macro Nutrients,
45. Write two units of energy.
46. Define the term nutrition
47. Define Health.

48. What is “Balanced Diet”?
49. What do you mean by energy balance?
50. Why human milk is called the ‘Sweetest milk’?

Two mark questions

1. Differentiate water soluble and fat soluble vitamins
2. What does Iron do for the body?
3. Food guide pyramid
4. Types of malnutrition
5. Deficiency of Vit D
6. Classification of minerals
7. Extruded foods
8. What does a Riboflavin deficiency cause?
9. What really is a Junk foods? Is that healthiest.
10. Classification of foods.
11. Define vitamins.
12. Draw the structure of vitamin D.
13. Define balanced diet.
14. Deficiency of fat soluble vitamins.
15. Deficiency of water soluble vitamins.
16. Differentiate fortification and enrichment/
17. Deficiency of iron and iodine.
18. Deficiency of sodium and potassium.
19. Detail note on toxicity and deficiency of water.
20. Differentiate organic foods and functional foods.
21. What is BMR and factors affecting BMR

22. Bioavailability and deficiency of calcium
23. Classification of food based on nutritive value
24. Definition and types of malnutrition
25. Describe “food as a source of energy”
26. Explain GM foods and proprietary foods
27. Give an account of nutritive value of fruits and vegetables in diet
28. Detail the structure of vitamin A, and D.
29. Classification of foods based on origin.
30. Write briefly on water balance.
31. Define Proprietary foods and fabricated foods.
32. Write a short note on polyphenols.
33. Highlight the factors affecting BMR.
34. What is the difference between Nutrigenomics and Nutrigenetics.
35. Suggest two recipes rich in Vitamin A suitable for a pre-school child.

Four Mark Questions

1. GM foods
2. Enrichment and Fortification, give examples of both vitamins and minerals
3. Functions and deficiency of calcium in our body
4. Malnutrition.
5. Functions of foods
6. Water functions and sources
7. Organic foods and functional foods
8. Describe basic 5 groups of foods

9. Write a short note on nutrition
10. Write the difference between water and fat soluble vitamins
11. Explain the relationship between food and health.
12. What is food pyramid draw and explain.
13. Define Probiotics and its functions.
14. Classify Nutraceuticals substance based on food source.
15. Briefly discuss about PEM.
16. Suggest two low cost recipes of packed lunch for school going children.
17. How will you determine energy value of food? What is BMR?
18. Define Bioavailability. Discuss any five importance of RDA.
19. What do you mean by “nutritional status”?
20. What do you mean by “Positive Health”? Discuss the concept of absence of disease.

Fifteen Mark Questions

1. Write essay on Vitamins.
2. Discuss classification of foods and their importance.
3. Write in detail on minerals.
4. What are vitamins? Explain the different types of vitamins
5. Explain in detail the various new concepts of foods.
6. Explain the effect of deficiency and over consumption of dietary sources on health.
7. Write the concept and definition of terms:
 - a) Nutrition and Health
 - b) Malnutrition
 - c) Characteristics of a reference man and women

8. What are minerals? Explain the classifications of minerals.

9. List out and explain the deficiency of minerals.

10. Write a short note on:

a) Factors affecting Energy balance.

b) Main components of total energy expenditure.

c) Calculate total Energy values and percentage of total Energy intake:

A deluxe fast-food ham burger contains about 45 grams of carbohydrates, 39 grams of fat and 27 grams of protein.

11. Give a detailed account on:

a) Importance and functions of water.

b) Polarity of water.

c) Structure of water.

d) Properties of ice.

12. Explain Vitamin A with reference to:

(a) Functions

(b) Deficiency

(c) Requirement

(d) sources.

13. Classify and explain of foods based on:

a) Origin

b) pH

c) Nutritive value

d) Functions

14. Give an account on nutrition for athletes.

15. How food groups play an important role in planning the balance diet. Explain.

B.Voc Food Science - Semester II
SDC2FS05-Dairy Technology

One Mark Questions

1. What synthetic milk?
2. Least variable component of milk.
3. ----- is responsible for the yellow colour of milk.
4. Cheddaring.
5. Composition of milk.
6. Probiotics? Mention one of the dairy probiotic strains.
7. What is standardized milk?
8. Bactofugation.
9. Flow diversion valve.
10. How milk spray dryer atomizer produce different particles?
11. Neutralization of cream.
12. Cheese is a -----coagulated dairy product.
13. Management Practices for milking.
14. Which constituents is reduced in milk due to microbial growth.
15. Hurdle Technology.
16. Pasteurization.
17. Alkalinity test.
18. Composition of toned milk.
19. Why toned milk is differ from homogenised milk?
20. What is exactlybutter?
21. Emulsifier in ice-cream.
22. What is whey?
23. Degradation of milk by proteolytic organisms resulted in the production of -----
24. Casein constitutes -----% of total milk protein.
25. ----- liberation test is used to know the presence of phosphatase in milk
26. Ripening of cheese.
27. Milk preservation.
28. Heat effect on milk contents.
29. Spoilage of milk.

30. Define milk sugar.
31. Indigenous milk products.
32. What is a CIP cleaning system?
33. What is plant hygiene?
34. Important hygiene practises, maintain in dairy industry?
35. Whole milk.
36. Detergents.
37. Plate heat exchanger.
38. Immediately after pasteurization milk is cooled to _____ or below?
39. Classify the advantages and disadvantages of centrifugal and gravity method of cream separation.
40. What is SIP cleaning?
41. What are legal standards for milk in India?
42. What is reconstituted milk?

43. Principle of homogenizer?
44. Tetra pack?
45. What is the time and temperature relationship used in HTST method of pasteurization?
46. Atomization?
47. What is UHT pasteurized?
48. Pearson's square.
49. Properties of refrigerant
50. What is overrun of ice cream

Two Mark Questions

1. What is homogenization process?
2. Write about the different methods of butter making.
3. Discuss about the application of membrane processing in dairy industry.
4. Write a note on manufacture of milk powder.
5. What are the role of ice cream ingredients?
6. Defects in butter, their causes and prevention.
7. Flow chart of milk processing, types of milk grades.
8. Milk coagulating enzymes in cheese manufacture
9. What is condensed milk and how it is prepared?
10. What are the physiochemical properties of milk?
11. What are the differences between fermented dairy products and cheese?
12. Define probiotic, prebiotic and synbiotic?
13. Give the location and function of flow diversion valve in HTST pasteurizer.
14. Factors affecting composition of milk
15. Define pasteurization, what are the types.
16. How is milk collected and transported?
17. What are the sources of milk and composition of milk?
18. How to test quality of milk?
19. Different platform tests for raw milk at reception unit.
20. What is plate heat exchanger and types?
21. What are the benefits of UHT milk processing?
22. What are the two types of cooling system?
23. What are the methods used in a system for cooling?

24. Differentiate batch and continues pasteurization
25. What is the process of making panneer?
26. Does Organic Milk Taste Better?
27. What is lactose intolerance?
28. How does MBR test for judging the quality of milk
29. Write on Nutritive value of milk.
30. Define VHT and Lactoferrin

Four Mark Questions

1. Explain the steps of the CIP cleaning method
2. What are the chemicals used in sanitizing and cleaning, detailed procedure
3. Differentiate SIP and CIP.
4. Explain platform tests done for milk reception unit
5. Explain microbiology of milk.
6. What is homogenization? Explain the process with a neat labelled diagram?
7. Briefly explain the membrane processing technique.
8. Explain the following below:
 - a) Rennet
 - b) Inoculation culture
 - c) UHT
9. Explain the preparation of cheddar cheese with flow chart.
10. Name some fermented dairy products. Explain them.
11. Write down the process flow chart of milk?
12. Write down the chemical composition of milk in the form of flow chart?
13. Explain the following below:
 - a) Flavoured milk
 - b) Probiotics
 - c) Shrikand
14. What are the common adulterants found in milk?
15. What is casein? Explain with structure.
16. What is condensed milk and how it is prepared?
17. Therapeutic effects on fermented dairy products.
18. Differentiate skim milk powder and whole milk powder
19. Define the following terms:
 - a) Lactometer
 - b) Food hygiene
 - c) Ghee

20. How spray drier works with labelled diagram.

Fifteen Mark Questions

1. Differentiate the followings :
 - a) Acid - Alkali
 - b) Clean water - Clear water
 - c) Detergents - Sanitizers
 - d) Rinse – Disinfection
2. Write a detail note on manufacture of milk powder with flow chart.
3. Give the classification of cleaning compounds with their major functions.
4. Explain the preparation of Mozzarella Cheese with flow chart.
5. Explain the production of ice-cream with flow chart.
6. Explain the preparation of butter with flow chart.
7. Write a short note on:
 - a) Oil-in-water emulsion
 - b) Method for manufacture of Channa.
 - c) Membrane Technology in dairy industry.
8. What is the purpose of adding stabilizer and emulsifier in ice-cream? And also write packaging of ice-cream.
9. Discuss about:
 - b) Bacterial growth curve.
 - c) Nutritive Value of milk.
 - d) Milk fat structure and function.
10. Write a short note on:
 - a) Evaporated milk.
 - b) Double toned milk.
 - c) Reconstituted milk
 - d) Standardized milk
11. Discuss about Opportunities and Challenges in the Indian dairy industry.
12. Write a short note on:
 - a) Types of pasteurization.

- b) Pearson's square method.
 - c) How can separate cream from milk. Explain the process.
13. Write down the In-Plant cleaning system in diary plant.
 14. Explain the preparation of Panner with flow chart.
 15. Explain briefly the factors effecting composition of milk and physiochemical properties of milk.

**FIRST SEMESTER B VOC EXAMINATION
(CUCBCSS-UG)
FOOD SCIENCE
SDC2FS07-PACKAGING TECHNOLOGY**

Part A

*Answer all the following
Each question carries 1 mark*

1. Expand HDPE
2. Define food packaging
3. List out major packaging materials
4. List out the components of corrugated boards
5. Materials required for the production of glass
6. What is tin free steel
7. Expand LDPE
8. Expand PVC
9. Write an example of secondary packaging
10. Mention main functions of packaging
11. Write an example of perishable foods
12. Minimum water activity for the growth of bacteria
13. Minimum water activity for the growth of yeast
14. Write an example of excellent pests resistant packaging material
15. melting temperature of glass
16. Define Gob
17. Expand B & B Moulding and P & B moulding
18. What is SBS
19. Types of aseptic packaging
20. Write any 2 example of active packaging

21. Write an example of synthetic antioxidants
22. Name the important gases used in map
23. Normal composition of air
24. The percentage of Oxygen present in redmeat under MAP
25. List out the 4 steps in shrink wrapping
26. List out the main 2 steps in stretch wrapping
27. Name the plastic materials used in shrink wrapping
28. List out the intrinsic and extrinsic factors of shelf life
29. Define water activity
30. Define fibrillation
31. Composition of air
32. Tetra pack was started in
33. GSM is stands for
34. Define lag and log phase
35. Define halophilic organisms
36. Give an example of non-enzymatic browning
37. The green color of plants is responsible for the presence of
38. Define cullet
39. Mention the 4 types of metals used for packaging
40. The chemical used in craft process
41. Boiling temperature of sulphite pulping
42. Define free radicle
43. What is osmophilic organisms
44. Define volatile substance
45. Write and example of semi perishable foods

46. Most sensitive vitamin in food
47. Write an example of thermoplastic
48. Write an example of thermoset plastics
49. Write an example of noble gas
50. Name the product commonly used in dipping process

Part B

Answer all the following

Write briefly on.

Each question carries 2 marks

1. What is lacquering
2. List out the functions of packaging?
3. Why is packaging necessary for marketing?
4. What is the primary function of packaging?
5. What is secondary function of packaging?
6. What are the classifications of packaging?
7. How packaging plays the role of “passive salesman”?
8. Packaging is the art and science. Justify?
9. How packaging acts as a barrier?
10. How packaging helps in product identification?
11. How packaging helps in product protection?
12. How packaging provides convenience?
13. Packaging is an essential part of processing and distributing food. comment on it.
14. How packaging helps in product promotion?
15. Differentiate consumer packaging and industrial packaging
16. Define food packaging.
17. Which are the different packaging materials?
18. What are the advantages of food packaging?
19. What are the uses of food packaging?
20. Draw the flow chart of aseptic packaging
21. Explain on the necessity of the tertiary packaging in food packaging.
22. Comment on some disadvantages of packaging
23. Parameters for measuring shelf life
24. Briefly explain flexible packaging.
25. Mention the main objectives of secondary packaging.
26. What is the role of packaging in food industries?
27. Write essay on printing process?
28. Properties of craft paper and sulphite paper?

29. Write the steps of paper processing?
30. What is the composition of glasses?
 31. Write about the uses of glass.
 32. What are the advantages and disadvantages of glass?
 33. Write down the main drawbacks of tin.
 34. What is fluidized bed coating?
 35. What are the disadvantages of plastics?
 36. What is HDPE and write its application?
 37. What is LDPE and polystyrene?
 38. Write the advantages of aluminium.
 39. Factors affecting shelf life study
 40. Define GTR
 41. What is meant by edible packaging?
 42. Give the advantages of edible packaging
 43. Give the disadvantage of edible packaging.
 44. Advantages of MAP
 45. Disadvantages of CAP
 46. Differentiate offset lithography and screen printing
 47. Classification of printing methods
 48. forming
 49. Write advantages of polypropylene
 50. Write note on different types of moulding
 51. Legislative and Safety aspects of packaging
 52. Write short essay on packaging standards and regulations

Part C (Short Essay Type Questions)

Answer any six of the following

Each question carries 4 marks.

1. Describe the functions of packaging.
2. Explain the requirements for effective packaging.

3. Types of packaging with examples. Explain.
4. Write the advantages and disadvantages of the 3 types of packaging
5. Factors affecting deterioration of foods
6. Explain paper as a packaging material.
7. Explain on the classification, advantage and disadvantages of paper.
8. Explain the manufacturing of glass
9. List out the advantages and disadvantages of glass
10. Write briefly about wooden boxes
11. Explain tetrapack.
12. Briefly describe on the advantage, disadvantages and uses of tin.
13. Packaging materials used for dairy products
14. Explain the properties of aluminium and also advantage and disadvantages of aluminium.
15. Differentiate LDPE and HDPE
16. Explain plastic as a packaging material.
17. Describe edible packaging and method of coating applications.
18. What are the advantage and disadvantages of plastic?
19. Tools in intelligent packaging
20. Advantages and disadvantages of polypropylene
21. Differentiate mechanical pulping and chemical pulping
22. Method of coating application
23. Differentiate thermoplastic and thermoset plastic with examples
24. Packaging of granular products
25. Write note on WVTR
26. Legislative and safety aspects of food packaging
27. Write a note on aseptic packaging?

28. Explain on edible packaging as a new trend in the food industries
29. Explain the advantages and disadvantages of aseptic packaging
30. Differentiate shrink and stretch packaging
31. Explain tetrapack using diagram
32. What are biodegradable packaging
33. Explain MAP
34. Explain CAP
35. Explain different layers of tetra pack
36. Explain mixing and forming process
37. Write detail note on glass moulding
38. Benefits of wooden boxes
39. Explain pulping and beating
40. Differentiate chemical pulping and mechanical pulping
41. Explain gases used in MAP
42. Types of active packaging
43. Write short note on semirigid containers
44. Benefits of wooden boxes
45. Write note on annealing
46. Explain chemical changes occur in food
47. Explain biological changes in food
48. Differentiate edible film and edible coating
49. List out the advantages of edible film and edible coating
50. Explain the different layers of tetra pack with diagram.

Part D (Essay Type Questions)

Answer any two of the following

Each question carries 15 marks

1. Briefly explain paper and glass act as a packaging material?
2. Write essay on food packaging and its importance
3. Write essay on different packaging materials
4. Briefly explain plastic as a packaging materials
5. Differentiate aseptic packaging and active packaging
6. Write essay on special packaging
7. Explain packaging testing
8. Give a detail note on the various materials used for packaging.

Explain on packaging:

- Importance
- Functions
- Characteristics
- Classification
- Advantages
- Disadvantages

9. Explain on:

- a. Flexible packaging
- b. Rigid packaging
- c. Semirigid packaging

10. Explain briefly on the classification of packaging with examples

11. Give definition, functions and requirements for effective packaging.

12. Explain packaging. What is its importance in marketing a product?
13. In what all the way the food packaging protects the product
14. Why special packagings are important explain and list out the advantages?
15. Write detail note on edible and biodegradable packaging.

B.Voc Food Science - Semester III

SDC3FS09: Technology of Fish, Meat and Egg Processing

One Mark Questions

1. Pigment responsible for red colour in meat.
2. Which acid is formed during Rigor Mortis?
3. Egg shell is rich in _____
4. Distribution of fat in Meat is called _____.
5. Fish Protein Concentrates (FPC).
6. Composition of meat.
7. Fish Protein Extracts (FPC).
8. Rigor mortis.
9. Which are the egg proteins.
10. What makes meat red or white?
11. Ageing of meat.
12. What is meat analogues?
13. HALAL meat.
14. What is 'boar taint'?
15. What is egg pulp?
16. 'Designer eggs'
17. What are the types of muscle/
18. Any two novel methods of meat preservation.
19. Banding pattern seen in animal muscles.
20. Myosin and Actin.
21. Oil,lemon,vinegar and spices applied to meat is called.
22. Name any 2 curing agents used in meat.
23. Expand FPC.
24. Define surimi.
25. Name the carcinogenic compound produced during smoking.
26. Define osmosis.
27. List out the problems during canning of fish.
28. Define drip loss.

29. Define thawing.

30. Name the organism responsible for the pink rots in egg.

Match the following

- | | |
|-------------------------------|------------------------|
| 1. Connective tissue proteins | Water holding capacity |
| 2. Nitrite | Myoglobin |
| 3. Poly phosphate | Collagen, Elastin |
| 4. Sarcoplasmic protein | Pink colour |

State whether True or False

1. Ultimate PH of meat is 7.0. 1
2. Egg white is rich in all essential amino acids.
3. Animal fat is rich in saturated fatty acids.
4. Candling is used for external evaluation of egg.

Two Mark Questions

1. What is humane method of slaughter?
2. What is the role of nitrite in curing of meat?
3. How is egg preserved by coating?
4. What is candling?
5. What is Fish Surimi?
6. What are the changes that occur during storage of eggs?
7. Define Sausage.
8. What is ageing of meat?
9. Draw a labelled diagram of muscle.
10. Quality evaluation of egg.
11. Define carcass.
12. Differentiate Fresh water and Marine water fish.
13. What is the main ingredient in meat tenderizer?
14. What are RTE meat and poultry products?
15. Thermal processing of eggs.
16. Differentiate modern and traditional production lines of fishery products.
17. Draw the structure of myoglobin. Its functions.

18. Different types of religious slaughter.
19. What are the egg products?
20. How does tenderness of meat increases with age?
21. What are the post – mortem changes in meat?
22. What is the protective coating on eggs?
23. What factors can cause the deterioration of eggs in storage?
24. What are the factors that affect egg quality?
25. Write are the two thermal processing methods in meat industry.

Five Mark Questions

1. Egg quality determination.
2. Post Mortem Inspection.
3. Fish Meal.
4. Meat curing Methods.
5. Freezing of eggs.
6. Explain any two by products in fish processing industry.
7. What is industrial importance of eggs?
8. Explain the Technology of sausage preparation.
9. Quality evaluation of egg.
10. What are the quality control parameters of fish?
11. Note fish protein concentrates.
12. Explain the factors affecting the quality of fish.
13. What is the composition and nutritive value of meat?
14. Write a short note on sliding filament theory?
15. Give the flow chart for canning of fish.
16. What is the composition and nutritive value of egg?
17. Inscribe two most important theories if rigor mortis.
18. What is homeostasis? Summarize the muscle to meat conversion process.
19. Explain the oxidation and reduction process of formation of different forms of myoglobin.
20. Explain in detail about the different types of stunning and slaughtering.

Fifteen Mark Questions

1. Explain the different methods of fish preservation.
2. Describe spoilage of fish:
 - a) Microbial.
 - b) Physiological.
 - c) Biochemical.
3. Discuss in detail of the preservation of meat.
4. Give a detailed account on the current challenges to meat industry in India.
5. Explain briefly the canning process of fish with flow chart.
6. Draw a labelled diagram of egg. Write a short note on:
 - a) Composition.
 - b) Nutritive value.
 - c) Egg proteins.
7. Elaborate on :
 - a) Factors effecting egg quality
 - b) Characteristics of fresh egg.
 - c) Any two preservation methods.
8. Give a detailed account on:
 - a) Curing.
 - b) Chemistry.
 - c) Methods of curing.
9. Explain detail on the complete Quality Control of fish.
10. Write down the:
 - a) Production of smoked fish.
 - b) Smoke components.
 - c) Quality and nutritive value of smoked fish.
11. Write a detailed note on:
 - a) Meat colour and factor influencing colour variation.
 - b) Water holding capacity of red meat.
 - c) Emulsification capacity of meat.
12. Describe cooking of meat and its eating quality.
13. Discuss on by – products of fish industry and utilization.
14. Explain the flow chart for the manufacturing of sausages.

15. Write a note on post - mortem changes in meat – rigor mortis.

**THIRD SEMESTER B Voc DEGREE EXAMINATION
(CUCBCSS-UG)
B.Voc. FOOD SCIENCE
SDC3FS10-TECHNOLOGY OF SPICES AND PLANTATION CROPS**

Time: Three hours

maximum: 80 Marks

Part A

*Answer all the following
Each question carries 1 mark*

1. The main important chemical constituents of spice are.....?
2. Name the second largest producer of spices?
3. The important chemical constituent present in pepper?
4. Moisture content of cardamom?
5. The major component present in black pepper?
6. Write any two examples of major spices?
7. Write an example of seed spice?
8. Average moisture content of turmeric?
9. Expand HPLC?
10. Scientific name of nutmeg?
11. Expand AAS?
12. Name the organism which extract lipase
13. Main constituent of cinnamon leaf oil
14. Major constituent present in cinnamon bark oil
15. Largest producer and consumer of spices
16. Write any 2 example of tree spices
17. Curcumine is present in
18. Moisture content of pepper

19. Percentage of moisture content of cardamom
20. Pigment present in plants
21. Scientific name of cinnamon
22. The medicinal property of nutmeg is because of the presence of
23. Define case hardening
24. Define blanching
25. The antibacterial property of nutmeg is because of the presence of.....
26. The percentage of essential oil present in nutmeg
27. list out the characteristics of cassia
28. What is quillings
29. Scientific name of clove
30. 87% of clove essential oil contain?
31. Scientific name of vanilla
32. Scientific name of cardamom
33. Scientific name of ginger
34. Scientific name of chilli
35. What is oleoresins
36. Define essential oil
37. Which plant part is used as cumin
38. Which plant part of saffron is used as a spice
39. What are the herbal spices
40. The main compound present in black pepper
41. List out the different types of test which make up the range of international standards
42. Define chromatography

43. Scientific name of cashew
44. Expand CNSL
45. Common adulteration in chilli powder
46. Common adulteration in cinnamon
47. What is cryogenic grinding
48. Expand ASTA
49. Define curry powder
50. Which plant part is used as turmeric

Part B

Answer all the following

Write briefly on.

Each question carries 2 marks

1. Define spice
2. Define volatile oils
3. Classification of spices
4. List out the major spices
5. Functions of spices
6. Write short on spice drying
7. Differentiate mobile phase and stationary phase
8. Define quality
9. Classify the spices based on the parts of the plant
10. Define volatile oil
11. List out the major constituents of clove, ginger, turmeric, black pepper

12. Packaging and storage of spices
13. Spice reconditioning
14. Define quillings
15. Featherings
16. Chips
17. Nutmeg butter
18. Essential oil from cinnamon
19. List out the major types of vanilla
20. Rolling step of cinnamon
21. List out the names of flavors produced by enzymes
22. Uses of vanilla
23. Uses of pepper
24. White pepper
25. Ground pepper
26. Turmeric oleoresins
27. Clove oil
28. Dry chilli production
29. Main uses of chilli
30. Bleached cardamom
31. List out the different solvents used for extracting oleoresins
32. Differentiate leaf oil and bark oil from cinnamon
33. Harvesting of cinnamon
34. Organic spices
35. Composition of cashew
36. HPLC

37. Define cassia
38. Differentiate cassia and cinnamon
39. Uses of CNSL
40. Soaking or conditioning of cashew

Part C (Short Essay Type Questions)

Answer any six of the following

Each question carries 4 marks.

1. Major international quality specification of spices
2. Gas chromatography
3. HPLC
4. Nutmeg butter
5. Nutmeg oleoresin
6. Nutmeg oil
7. Major classifications of spices
8. Functions of spices
9. Spice processing
10. Explain drying
11. Chromatography
12. Processing of ginger
13. byproducts obtained from cinnamon
14. Uses of nutmeg
15. Uses of cinnamon
16. Uses of turmeric
17. Differentiate processing of cinnamon and nutmeg
18. Applications of oleoresins

19. Solvent extraction
20. Super critical fluid extraction
21. Differentiate solvent extraction and super critical fluid extraction
22. Clove
23. Enzymatic synthesis of flavor identicals
24. Describe the cleaning and drying of spices
25. Differentiate gas chromatography and liquid chromatography
26. List out the composition of nutmeg and mace
27. List out the applications of clove
29. Detail note on ground spices, organic spices and processed spices
30. Traditional method of cashew processing
31. Advantages and disadvantages of ground spices
32. Advantages and disadvantages of oleoresins

Part D (Essay Type Questions)

Answer any two of the following

Each question carries 15 marks

1. Write essay on processing of nutmeg and uses
2. Detail note on spice processing and importance of spices in food
3. Describe “replacement of spices with oil and oleoresins”.
4. Differentiate the processing of cinnamon and turmeric

5. Write essay on pepper processing
6. Write detail note on spice volatile oils and oleoresins
7. Write essay on composition structure, uses and processing of cashew
8. Explain introduction , classification and functions of spices
9. Give an account of processing chilli , clove and ginger
10. Write essay on value added products from spices

B.Voc Food Science - Semester III

SDC3FS11-Food Additives and Flavor Technology

One Mark Questions

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
- 16.Vitamin B12 is stands for.....
- 17.Expand GMO.
- 18.Any two techniques used of extraction of essential oils.
- 19.Supercritical fluid extraction.
- 20.E number of carotenoids.
- 21.Functions of Nutraceuticals.
- 22.What is the optimum temperature required for the action of lysozymes.
- 23.What is the effective level of ascorbic acid in food?
- 24.pH level of benzoic acid?
- 25.How much the percentage of acetic acid present in vinegar?
- 26.Write any two example of classII preservatives.
- 27.How are food additives determined safe?
- 28.What are the safety testing's of food additives?
- 29.Define Reference Dose.

30. Define Acceptable daily intake.
31. What are six categories of food additives?
32. What is food additives numbering system?
33. What is the acceptable daily intake of food additives?
34. Define solvent extraction.
35. Prebiotics.
36. What are the best soluble in foods?
37. What are flavor composites?
38. Xylitol.
39. How do I know which additives are in my food?
40. What are the potential benefits on health by fructooligosaccharides?

Two Mark Questions

1. Define Food additives.
2. Importance of food additives in food.
3. List out the major classifications of food additives.
4. Intentional food additives.
5. What are incidental food additives?
6. What is class I preservative?
7. Class II preservative.
8. Write the functions of salt as a preservative.
9. What are chemical preservatives?
10. Lysozyme.
11. E numbering.
12. Purpose of coloring agents in food.
13. Chlorophyll.
14. What is BHA

15. What is essential oil?
16. What is oleoresins?
17. Nitrosamine.
18. What are sequestrants.
19. How is the consumer informed about the use of additives?
20. What are the types of food additives?
21. What are the artificial colors?
22. What are artificial and natural preservatives?
23. Explain artificial sweeteners.
24. Functions of acidulants.
25. Why citric acid is used as an acidulants.
26. Differentiate acidic buffer and basic buffer with examples
27. Define GMO.
28. Risk of GMO.
29. Fructooligosacharides.
30. What is Millardreaction?

Five Mark Questions

1. Write short note on food additives.
2. Role of food additives in food.
3. List out the functions of food additives.
4. Classify food preservatives.
5. Differentiate intentional and incidental food additives.
6. Differentiate class I and class II preservatives.
7. Explain salt and sugar as a preservative.
8. Nitrates and nitrites as a preservative.
9. Differentiate natural and artificial coloring agents with example.
10. Define antioxidants with example.
11. Protein as a functional ingredient.
12. Artificial colors.

13. List out the toxicants produced during food processing
14. Extraction techniques of flavor.
15. How are food additives determined safe?
16. Write short note on types of spices used as flavoring agents.
17. Manufacturing of oleoresins using solvent extraction.
18. List out the advantages of essential oils and oleoresins.
19. Factors affecting the stability of flavor.
20. Describe the uses of anticaking agents with example.

Fifteen Mark Questions

1. Write essay on food additives.
2. Explain food preservatives, antioxidants and food coloring agents.
3. “All food additives are carcinogenic” justify your answer.
4. Describe genetically modified foods: Safety, Risks and Public concern.
5. Give a detailed account on:
 - a) Protein isolation and purification.
 - b) Protein modification.
 - c) Protein specification as a dietary supplements.
6. Describe the functional properties and application of proteins in foods.
7. Discuss the work flow diagram showing the starch isolation and purification.
8. Write an essay on:
 - a) Extraction and isolation methods of flavors.
 - b) Sensory and instrumental analysis of flavors.
9. Write the concept and definition of terms:
 - a) Hydrocolloids
 - b) Humectants
 - c) Anticaking agents
 - d) Buffering salts

10. Write a detail note on:

- a) Safety evaluation of food additives.
- b) Beneficial and toxic effects food additives.