



HINDUSTAN

**INSTITUTE OF TECHNOLOGY & SCIENCE
(DEEMED TO BE UNIVERSITY)**

DEPARTMENT OF FOOD TECHNOLOGY

CURRICULUM AND SYLLABUS

Under CBCS

(Applicable for Students admitted from Academic Year 2018-19)

B. Sc. Food Technology

DEPARTMENT OF FOOD TECHNOLOGY

SCHOOL OF LIBERAL ARTS AND APPLIED SCIENCES

**HINDUSTAN INSTITUTE OF TECHNOLOGY & SCIENCE
VISION AND MISSION**

MOTTO

“TO MAKE EVERY MAN A SUCCESS AND NO MAN A FAILURE.”

VISION

To be an International Institute of Excellence, providing a conducive environment for education with a strong emphasis on innovation, quality, research and strategic partnership blended with values and commitment to society.

MISSION

- To create an ecosystem for learning and world class research.
- To nurture a sense of creativity and innovation.
- To instill highest ethical standards and values with a sense of professionalism.
- To take up activities for the development of Society.
- To develop national and international collaboration and strategic partnership with industry and institutes of excellence.
- To enable graduates to become future leaders and innovators.

VALUE STATEMENT

Integrity, Innovation, Internationalization

**DEPARTMENT OF FOOD TECHNOLOGY
VISION AND MISSION**

VISION

To enable the graduates to be successful in their career as a Food Technologist.

MISSION

- To impart high quality education to build the students ability and enhancing their skills to make them globally competitive Food Technologist.
- To develop state of the art research facilities to provide collaborative environment that stimulates the opportunities to create, analyze, apply and disseminate knowledge.

ACADEMIC REGULATIONS FOR B.A / B. Sc / BBA/ B.COM DEGREE PROGRAMME

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I. PREAMBLE

As per the recommendations of UGC, the Hindustan Institute of Technology and Science (HITS) has introduced Choice Based Credit System (CBCS) from the academic year 2015-16. Choice Based Credit System (CBCS) is a proven, flexible mode of learning in higher education which facilitates a student to have guided freedom in selecting his/her own choices of courses in the curriculum for completing a degree program. CBCS offers a flexible system of learning.

The system permits a student to

- (i) Learn at their own pace through flexible registration process.
- (ii) Choose electives from a wide range of courses offered by parent and other departments.
- (iii) Undergo additional courses to acquire the required number of credits for obtaining Liberal Arts / Applied Science (Hons.)
- (iv) Undergo additional courses in their special areas of interest and earn additional credits to obtain Liberal Arts /Applied Science with Minor Specialization.
- (v) Adopt an interdisciplinary approach in learning.
- (vi) Avail transfer of Credits.
- (vii) Gain Non – CGPA credits to enhance skill/employability by taking up project work, entrepreneurship, co-curricular and vocational training.
- (viii) Make the best use of the expertise of available faculty.
- (ix) Learn and earn credits through MOOC and Project Based Learning.
- (x) Enhance their Knowledge, Skill and Attitude through participation in innovative Curriculum Design, Delivery and Assessments.

The Curriculum is designed to take into the factors listed in the Choice Based Credit System (CBCS) with a focus on Project Based Learning and Industrial Training so as to enable the students become eligible and fully equipped for employment in industries, higher studies or entrepreneurship.

II. DEFINITIONS AND NOMENCLATURE

In these Regulations, unless the context otherwise requires:

1. “Programme” means, Degree Programme that is Undergraduate Degree in Liberal Arts /Applied Science Stream Programme.
2. “Discipline” means, specialization or branch of Degree Programme, [E.g. Fashion Design, Computer Applications, Commerce, Viscom, Arts etc.,].
3. “Course” means a theory or practical subject that is normally studied in a semester, like Business Economics, Finance and Accounting, etc.
4. “Vice – Chancellor” means the Head of the Institution.
5. “Registrar” is the Head of all Academic and General Administration of the Institute.

6. “Dean Academics” means the authority of the University, who is responsible for all academic activities of the Academic Programmes for implementation of relevant rules and Regulations pertaining to the Academic Programmes.
7. “Controller of Examinations” means, the authority of the University who is responsible for all activities of the University Examinations.
8. “Dean – Student Affairs” is responsible for all student related activities including student discipline, extra and co – curricular activities, attendance and meetings with class representatives, Student Council and parent – teacher meet
9. “HoD” means, the Head of the Department concerned.
10. “Institute” means, Hindustan Institute of Technology and Science (HITS), Chennai.
11. “TCH” means, Total Contact Hours – refers to the teaching – learning periods.
12. “DEC” means, Department Exam Committee.
13. “BoS” means, Board of Studies.
14. “BoM” means, Board of Management.
15. “ACM” means, Academic Council the highest authoritative body for approval for all Academic Policies.
16. “Class Teacher” is a faculty of the class who takes care of the attendance, monitor the academic performance and the general conduct of the students of that class.
17. “CIA” is Continuous Internal Assessment which is assessed for every student, for every course during the semester.
18. “ESE” is End Semester Examination which is conducted by the Institute, at the End of the Semester for all the courses of that semester.
19. “AICTE” means, All India Council for Technical Education.
20. “UGC” means, University Grants Commission.
21. “MHRD” means, Ministry of Human Resource Development.

ACADEMIC REGULATIONS
Under Choice Based Credit System (CBCS)
(Effective from Academic year 2018 - 19)

1.0 Vision, Mission and Objectives

1.1 The Vision of the Institute is “To make every man a success and no man a failure”.

1.2 The Mission of the institute is

- To create an ecosystem that promotes learning and world class research.
- To nurture creativity and innovation.
- To instil highest ethical standards and values.
- To pursue activities for the development of the Society.
- To develop national and international collaborations with institutes and industries of eminence.
- To enable graduates to become future leaders and innovators.

Value Statement

Integrity, Innovation, Internationalization

Further, the Institute always strives

- To train our graduates with the latest and the best in the rapidly changing fields of Architecture, Engineering, Technology, Management studies, Science, Humanities and Liberal Arts.
- To develop graduates with a global outlook, possessing Knowledge, Skills and Attitude capable of taking up challenging responsibilities in the respective fields.
- To mould our graduates as citizens with moral, ethical and social values so as to fulfil their obligations to the nation and the society.
- To promote research in the field of Architecture, Engineering, Technology, Management studies, Science, Humanities, Liberal Arts and allied disciplines.

1.3 Aims and Objectives of the Institute are focused on

- Providing state of the art education in Engineering, Technology, Applied Sciences and Management studies.
- Keeping pace with the ever changing technological scenario and help the graduates to gain proper direction to emerge as competent professionals fully aware of their commitment to the society and the nation.
- To inculcate a flair for Research, Development and Entrepreneurship.

2.0 Admission

2.1. The admission policy and procedure shall be decided from time to time by the Board of Management (BOM) of the Institute based on the guidelines issued by the UGC/ Ministry of Human Resource Development (MHRD), Government of India. The number of seats in each discipline of the Liberal Arts /Applied Science programme will be decided by the Board of Management of the Institute as per the directives of AICTE/ UGC / MHRD, Government of India, taking into account the market demands. Seats are also made available up to 20% of the sanctioned intake for Non-Resident Indians and foreign nationals, who satisfy the admission eligibility norms of the Institute.

2.2. Eligibility for Admission

(i) Regular Entry

The Candidate should have qualified in 10 + 2 examination and should have obtained at least 50% marks (45% in case of candidate belonging to reserved category) in the qualifying examination.

(ii) Lateral Entry (Applicable for Fashion Design)

The candidates possessing a Diploma in in the relevant discipline of specialization with minimum 50% marks awarded by the State Boards of Technical Education, India or any other competent authority as accepted by the Board of Management of the Institute as equivalent thereto are eligible for admission to the 3rd Semester of the Fashion Design degree programme.

2.3 The candidate has to fulfil all the prescribed admission requirements / norms of the Institute.

2.4. In all matters relating to admission to the Undergraduate Degree programme in Liberal Arts / Applied Science stream, the decision of the Board of Management of the Institute shall be final.

2.5. At any time after admission, if found that a candidate has not fulfilled one or many of the requirements stipulated by the Institute, or submitted forged certificates, the Institute has the right to revoke the admission and will forfeit the fee paid. In addition, legal action may be taken against the candidate as decided by the Board of Management.

3.0 Student Discipline

Every student is required to observe utmost discipline and decorum both inside and outside the campus and not to indulge in any activity which may affect adversely the prestige/ reputation of the Institute.

3.1 Any act of indiscipline of a student reported to the Dean (Student affairs) and Head of the Departments will be referred to a Discipline Committee constituted for the purpose. The Committee will enquire into the charges and decide on a suitable punishment if the charges are substantiated. The committee will also authorize the Dean (Student Affairs) to recommend

to the Vice – Chancellor the implementation of the decision. The student concerned may appeal to the Vice – Chancellor whose decision will be final.

3.2 Ragging in any form is a criminal and non-bailable offence in our country. The current State and Central legislations provide stringent punishments including imprisonment. Once the involvement of a student is established in ragging, offending fellow students/staff, harassment of any nature to the fellow students/staff etc. the student(s) will be liable to be dismissed from the Institute, as per the laid down procedures of the UGC / Govt. /Institute. Every senior student of the Institute, along with their parent, shall give an undertaking every year in this regard and the same should be submitted at the time of Registration.

4.0 Structure of the Undergraduate Degree Programme in Liberal Arts and Applied Science stream

Choice Based Credit System (CBCS) was introduced from the Academic year 2015-16 in the curriculum to provide students a balanced approach to their educational endeavour.

4.1 All Undergraduate UG degree programmes in Liberal Arts / Applied Science stream for three years will have the curriculum and syllabi (course contents) as approved by the respective Board of Studies and Academic Council of the Institute.

4.2 Credits are the weightages are assigned to the courses based on the following general pattern:

4.4.1 One lecture / Tutorial period per week --- 1 credit

4.4.2 Up to Two periods of Practical per week --- 1 credit

4.3 The curriculum for Arts & Science degree programmes is designed to have a minimum of **110 credits + 4 Non – CGPA credits** distributed across SIX semesters of study for the award of degree.

Under CBCS, the degree programme will consist of the following categories of courses:

- i) General Core foundation (CF)** courses comprising of Humanities courses; Language Courses, Courses specific to the selected program etc.,
- ii) Compulsory Courses (CC) consisting of**
 - a. Professional Core (PC):** These courses expose the students to the foundation of specified subject topics related to the chosen programme of study comprising of theory and Practical/ field work/ Design project/ Project
 - b. Departmental Elective (DE):** These courses enable the students to take up a group of courses of their interest in the area of specialization offered by the parent Department / School.

- c. **Non –Departmental Electives (NE):** These courses are offered by departments (across disciplines) other than their parent Department. Two groups of Electives are available under NE namely, Electives offered by Core Departments and Open Electives offered by Non – Core departments.
- d. **Indexed Journal / Conference Publications:** If a student publishes a research paper in indexed Journal / Conference as main author, the same can be considered as equivalent to two credit course under NE.
- e. **Non-CGPA courses** offered in certain semesters are compulsory, but are not used for calculation of GPA and CGPA. However, the credits will be mentioned in the grade sheet.

4.4 Non-CGPA courses

The student shall select any two courses /activity from the following **Table 1** during the entire period of study. The student has to make his / her own efforts for earning the credits. The grades given will be Pass / Fail (P/F). The respective class teachers have to encourage monitor and record relevant activities of the students, based on the rules issued from time to time by the Institute and submit the End semester report to the Head of the Department.

Table 1. Non CGPA Courses

No.	Course / Activity	Credits
1.	Start ups	2
2.	Industrial Training	2
3.	Technical conference, seminar, competitions, Professional Societies	2
4.	Management courses	2
5.	Technical Certification Course	2
6.	Sports	2
7.	NCC	2
8.	NSS	2
9.	YRC	2
10.	Art and Cultural activities	2
11.	English Proficiency Certification	2
12.	Aptitude Proficiency Certification	2
13.	Foreign Languages Level II and above	2
14.	Publication in Conferences / Seminar	2
15.	Indexed Journal Publication per paper	2

- 4.5** A student must earn compulsorily the credits under each category shown in **Table 2** and also a minimum total of **114 credits (110 credits + 4 Non - CGPA credits)** for the award of undergraduate in Arts & Science stream. For Lateral entry students, the 41 credits earned in their Diploma programme is considered as equivalent to the credits earned in the first year courses of the respective UG Degree Programme. However, they have to earn a minimum of **118 credits (114 credits + 4 Non - CGPA credits)** for the award of the degree.
- 4.6** Students are eligible for award of the respective **UG (Hons.) Degree** upon successful completion of **126 credits (110 regular credits + 12 Additional Credits+ 4 Non - CGPA credits)** maintaining a CGPA of 8.0 with no history of arrears, as detailed in clause 7.0.
- 4.7** Students are eligible for the award of **the respective UG Degree** with minor specialisation upon successful completion of **126 credits (110 regular credits + 12 Additional Credits+ 4 Non - CGPA credits)**, as detailed in clause 8.0

Table 2. Distribution of Credits

No.	Category	Credits	Percentage
1	Basic Sciences & Humanities Courses	32	29
2	Professional Allied	18	16
3	Professional Core	38	35
4	Department Elective	6	5
5	Non – Department Electives	4	4
6	Enrichment Course	8	7
7	Project	4	4
	Total Credits	110	100
NON – CGPA			
8	Professional Development	4	---

- 4.8** The medium of instruction is English for all courses, examinations, seminar presentations and project reports.

5.0 Faculty Advisor

To help the students in planning their selection of courses and programme of study and for getting general advice on the academic programme, the concerned department will assign a certain number of students to a faculty member who will be called their Faculty Advisor. Such Faculty Advisor will continue to mentor the students assigned to him for the entire duration of the programme.

5.1 Class Committee

Every section / batch of the UG Degree programme will have a Class Committee consisting of Faculty and students.

The constitution of the Class Committee will be as follows:

- a. One Professor not associated with teaching the particular class shall be nominated by the Head of the Department to act as the Chairman of the Class Committee as approved by the Dean of the respective school;
- b. Course coordinator of each of the lecture based courses (for common courses);
- c. Four students from the respective class nominated by Head of the Department
- d. Faculty Advisors of the respective class.

5.2 Course Committee

Course committee shall be constituted by the HoD for all the common courses, with the faculty who are teaching the courses and with a Professor of the core department as the Chairman. The Course committee shall meet periodically to ensure the quality of progression of the course in the semester.

5.3 The basic responsibilities of the Class Committee and Course committee are

- a. To review periodically the progress of the students.
- b. To discuss issues concerning curriculum and syllabi and the conduct of the classes.
- c. To inform the students about the method of assessment as recommended by the Department Exam Committee (“DEC”) at the beginning of the semester. Each class committee / course committee will communicate its recommendations and the minutes of the meetings to the Head of the Department, Dean (Academics) and the Dean (Student Affairs).
- d. To conduct meetings at least thrice in a semester as per the Academic Plan issued by the Dean – Academics.
- e. To review the academic performance of the students including attendance, internal assessment and other issues like discipline, maintenance etc.

6.0 Registration for courses in a Semester

6.1 A student will be eligible for registration of courses in any semester only if the student satisfies regulation clause 12.0 (progression) 13.0 (maximum duration of the programme) and only if he/she has cleared all dues to the Institute, Hostel and Library up to the end of the previous semester provided that student is not debarred from enrolment on disciplinary grounds.

6.2 Except for the first - year courses, registration for a semester will be done during a specified week before the start of the semester as per the Academic Schedule.

Late registration /enrolment will be permitted by the Dean - Academics, on recommendation by the Head of the respective department, with a late fee as decided from time to time.

- 6.3** The student shall make the choice of course in consultation with the Faculty Advisor and as stipulated from time to time.
- 6.4** Students may have to pay additional fee for registering in certain elective courses under Non - Departmental Electives / Additional Credit Courses offered by certain specific Departments and for higher level Foreign Languages, as decided from time to time.

7.0 Under Graduate Degree (Honours) Programme

A new academic programme, under graduate (Hons.) degree is introduced in order to facilitate the students to choose the specialized courses of their choice and build their competence in a specialized area. The features of the new programme include:

- a. Students in UG degree regular stream can opt for UG (Hons.), degree provided they have CGPA of 8.0 up to the end of fourth semester, without any history of arrears.
- b. The students opting for this program have to take four additional courses of their specialization of a minimum of 3 credits each from 3rd to 6th semester with not more than 2 additional courses in a semester.
- c. The student can also opt for post graduate level courses.
- d. The faculty advisor will suggest the additional courses to be taken by the students based on their choice and level of their academic competence.
- e. Students securing “E” or “U” grade or “DE” category (ref: clause 16.0 – Grading) in any course, including the additional credit courses, are not eligible for Liberal Arts and Applied Science. (Hons) degree.
- f. The students have to pay the requisite fee for the additional courses.

8.0 Under graduate degree with Minor specialization in Liberal Arts / Applied Science stream

- a. Students, who are desirous of pursuing their special interest in areas other than the chosen discipline of Arts/ Fashion/ Humanities/ Management/ Basic Sciences, may opt for additional courses in minor specialisation groups, offered by a department other than their parent department. Such students shall select the stream of courses offered with pre – requisites by the respective departments and earn a Minor Specialization. The number of credits to be earned for Minor specialization is 12 credits. The students are permitted to register for their minor specialization courses from the V semester onwards subject to a maximum of 6 credits per semester.
- b. The students have to pay the requisite fee for the additional courses

9.0 Attendance

The teacher handling a course must finalise, the attendance 3 calendar days before the last instructional day of the course.

A student has to obtain minimum 75% cumulative attendance for all the courses put together in a semester.

The remaining 25% allowance in attendance is given to account for activities under NCC / NSS / Cultural / Sports / Minor Medical conditions etc.

9.1 Irrespective of the reason for the shortfall of the attendance, a student with a **cumulative attendance** of less than 75%, will **not** be permitted to appear for the end semester examination for all the courses in that semester and will be categorized as “DE”, meaning Detained due to shortage of attendance. The students with “DE” category cannot proceed to the subsequent semester.

Such students shall register for all the courses of the semester in which DE has occurred, in the subsequent year by paying the prescribed fee.

Additional condonation may be considered in rare and genuine cases which includes, approved leave for attending select NCC / Sports Camps, cases requiring prolonged medical treatment and critical illness involving hospitalization.

9.2 For medical cases, submission of complete medical history and records with prior information from the parent / guardian to Dean (Student Affairs) is mandatory. The assessment of such cases will be done by the attendance sub – committee on the merit of the case and put up recommendations to the Vice – Chancellor. Such condonation is permitted **only twice** for a student in the entire duration of the programme.

The Vice Chancellor, based on the recommendation of the attendance sub - committee may then give condonation of attendance, only if the Vice Chancellor deems it fit and deserving, but in any case the condonation cannot exceed 10%

10.0 Assessment Procedure

Every course shall have two components of assessment namely,

- a. Continuous Internal Assessment “CIA”: This assessment will be carried out throughout the semester as per the Academic Schedule
- b. End Semester Examination “ESE”: This assessment will be carried out at the end of the Semester as per the Academic Schedule

The weightages for the various categories of the courses for CIA and ESE is given in Table 3.

Table 3 Weightage of the CIA and ESE for various categories of the courses

No.	Category of Courses	CIA weightage	ESE	ESE Minimum	Passing minimum (CIA + ESE)
1	Theory Course	50%	50%	40%	40%
2	Practical Course	80%	20%	40%	40%
3	Theory Course with Practical Components	60%	40%	40%	40%
4	Department Elective (DE)/ Non – Department Elective (NE)	50%	50%	40%	40%
5	Design Project / Case Studies	100%	---	---	40%
6	Comprehension	100%	---	---	40%
7	Internship / Personality Development	100%	---	---	40%
8	Project and Viva Voce	50%	50%	40%	40%

10.1 Theory Course / DE / NE Assessment weightages:

The general guidelines for the assessment of Theory Courses, Department Electives and Non – Department Electives shall be done on a continuous basis as given in Table 4.

Table 4: Weightage for Assessment

No.	Assessment	Weightage	Duration
1.	First Periodical Assessment	10%	1 period
2.	Second Periodical Assessment	10%	1 Period
3.	Third Periodical Assessment	10%	1Period
4.	Seminar/Assignments/Project/ Lab	10%	--
5.	Surprise Test / Quiz / Lab	10%	--
6.	End Semester Exam	50%	2 to 3 hours

10.2 Practical Course: For practical courses, the assessment will be done by the course teachers as below:

Weekly assignment/Observation / lab records and viva as approved by the Department Exam Committee (“DEC”)

- | | | |
|-----------------------------------|----|-----|
| a. Continuous Internal Assessment | -- | 80% |
| b. End Semester Examination | -- | 20% |

10.3 Theory courses with practical Component: For theory courses with practical Component, the assessment will be calculated as approved by the “DEC” as follows.

- | | | |
|-----------------------------------|----|-----|
| a. Continuous Internal Assessment | -- | 60% |
| b. End Semester Exam | -- | 40% |

10.4 Design Project – Assessment

The general guidelines for assessment of Design Project is given in Table 5

Table 5: Assessment pattern for Design Project

No.	Review / Examination scheme	Broad Guidelines	Weightage
1.	First Review	Concept	20%
2.	Second Review	Design	30%
3.	Third Review	Experiment/Analysis	20%
4.	Project report and Viva – Voce	Results and Conclusion	30%

10.5 Comprehension – Assessment

The general guidelines for assessment of Comprehension is given in Table 6.

Table 6: Assessment pattern for Comprehension

No.	Review / Examination scheme	Broad Guidelines	Weightage
1.	First Periodical Assessment-MCQ	Basic Arts and Sciences	20%
2.	Second Periodical Assessment - MCQ	Allied core	50%
3.	Third Periodical Assessment – Presentation	Emerging Areas	30%

10.6 Internship

A student has to compulsorily attend Summer / Winter internship during 3rd year for a minimum period of one month.

In lieu of Summer / Winter internship, the student is permitted to register for undertaking case study / project work under a faculty of the Institute and carry out the project for minimum period of one month.

In both the cases, the internship report in the prescribed format, duly certified by the faculty in-charge shall be submitted to the HoD. The evaluation will be done through

presentation and viva - voce. The course will have a weightage of 1 credit or as defined in the respective curriculum.

- 10.7** For final year Project / Dissertation / Design Project/ Internship, the assessment will be done on a continuous basis as given in Table 7

Table 7: Assessment of Project work

No.	Review / Examination scheme	Weightage
1.	First Review	10%
2.	Second Review	20%
3.	Third Review	20%
4.	Project report and Viva – Voce	50%

For the final year project and Viva – Voce semester examination, the student shall submit a Project Report in the prescribed format issued by the Institute. The first three reviews will be conducted by a Committee constituted by the Head of the Department. The end – semester assessment will be based on the project report and a viva on the project conducted by a Committee constituted by the Registrar / Controller of examination. This may include an external expert.

- 10.8** For Non – CGPA courses, the assessment will be graded “Satisfactory/Not Satisfactory” and grades of Pass/Fail will be awarded.

10.9 Flexibility in Assessment

The respective Departments under the approval of the Department Exam Committee (DEC) may decide the mode of assessment, based on the course requirements.

11.0 Procedures for Course Repetition

If a student is detained in any semester for shortage of attendance (under “DE” Category), he/she shall re-register in the subsequent academic year, by paying the requisite fee for the semester in which he/she was detained and gain required attendance to become eligible to appear for the end semester examination.

12.0 Maximum Duration of the Programme

A student may complete the programme at a slower pace than the regular pace, but in any case in **not more than 5 years for Liberal Arts / Applied Science, and not more than 4 years for lateral entry students (as applicable)** excluding the semesters withdrawn as per clause **13.0**.

A student completing the degree programmes in the extended period will not be eligible for Institute ranking.

13.0 Temporary withdrawal from the Programme

- a. A student is permitted to take a break, up to a maximum of 2 semesters, during the entire programme to clear the backlog of arrears.

- b. A student may be permitted by the Vice- Chancellor to withdraw from the entire programme for a maximum of two semesters for reasons of ill health, Start – up venture or other valid reasons as recommended by a committee consisting of Head of Department, Dean of School, Dean (Academic) and Dean (Student Affairs).

14.0 Declaration of results

- 14.1** A student shall secure the minimum marks as prescribed in Clause 10.0 (Table 3) in all categories of courses in all the semesters to secure a pass in that course.
- 14.2 Supplementary Examinations:** If a candidate fails to secure a pass in a Theory / DE / NE courses (“U” grade) – as per clause 16.1 he/she shall register, pay the requisite fee and re-appear for the End Semester Examination during the following semesters. Such examinations are called Supplementary Examinations. The Internal Assessment marks secured by the candidate will be retained for all such attempts.
- 14.3** A candidate can apply for the revaluation of his/her end semester examination answer script in a theory course, after the declaration of the results, on payment of a prescribed fee.
- 14.4 After 4 years,** the internal assessment marks obtained by the candidate will not be considered in calculating the passing requirement. A candidate who **secures 40%** in the end semester examination will be declared to have passed the course and earned the specified credits, irrespective of the score in internal assessment marks.
- 14.5** If a candidate fails to secure a pass in Practical/Theory with Practical component/Design Project / Internship / Comprehension courses “U” grade – as per clause 16.1 he/she shall register for the courses in the subsequent semester when offered by the departments and shall pay the prescribed fee.
- 14.6** Revaluation is **not** permitted for Practical/Theory with Practical component/Design Project / Internship / Comprehension courses. However, only for genuine grievances as decided by the Exam Grievance Committee a student may be permitted to apply for revaluation.
- 14.7** Candidate who earns required credits for award of degree after 5 years (on expiry of extended period of 2 semesters over and above normal duration of course) he/she will be awarded only *second class* irrespective of his/her CGPA. However, the period approved under temporary withdrawal, if any, from the programme (13.0) will be excluded from the maximum duration as mentioned above.
- 14.8 Semester Abroad Programme:** Students who are allowed to undergo internship or Training in Industries in India or abroad during their course work or attend any National / International Institute under semester abroad programme (SAP) up to a maximum of 2 semesters will be granted credit equivalence for the Course Work/project work done by them in the Industry /Foreign Institute as per the recommendations of the credit transfer committee.

15.0 Grading

A grading system as shown in Table 10 will be followed.

Table 10: Grading system

Range of Marks	Letter Grade	Grade Points	Remarks
90 – 100	S	10	Outstanding
80-89	A	09	Excellent
70-79	B	08	Very Good
60-69	C	07	Good
50-59	D	06	Average
40 – 49	E	05	Pass
<40	U	00	To Reappear for end-semester examination

15.2 GPA and CGPA

GPA is the ratio of the sum of the product of the number of credits C_i of course “i” and the grade points P_i earned for that course taken over all courses “i” registered and successfully completed by the student to the sum of C_i for all “i”. That is,

$$GPA = \frac{\sum_i C_i P_i}{\sum_i C_i}$$

CGPA will be calculated in a similar manner, in any semester, considering all the courses enrolled from the first semester onwards.

15.3 The Grade card will not include the computation of GPA and CGPA for courses with letter grade “**U**” until those grades are converted to the regular grades.

15.4 A course successfully completed cannot be repeated.

16.0 Grade Sheet

Letter grade

Based on the performance, each student is awarded a final letter grade at the end of the semester in each course. The letter grades and corresponding grade points are given in Table 10.

16.1 A student is considered to have completed a course successfully and earned credits if he/she secures a letter grade other than **U** in that course.

- 16.2** After results are declared, grade sheet will be issued to each student which will contain the following details:
- Program and discipline for which the student has enrolled.
 - Semester of registration.
 - The course code, name of the course, category of course and the credits for each course registered in that semester
 - The letter grade obtained in each course
 - Semester Grade Point Average (GPA)
 - The total number of credits earned by the student up to the end of that semester in each of the course categories.
 - The Cumulative Grade Point Average (CGPA) of all the courses taken from the first semester.
 - Credits earned under Non – CGPA courses.
 - Additional credits earned for the respective UG degree (Hons.), or respective UG degree with Minor specialization.

17.0 Class/Division

Classification is based on CGPA and is as follows:

CGPA \geq 8.0: **First Class with distinction**

6.5 \leq CGPA < 8.0: **First Class**

5.0 \leq CGPA < 6.5: **Second Class.**

- 17.2** (i) Further, the award of '**First class with distinction**' is subject to the candidate becoming eligible for the award of the degree, having passed the examination in all the courses in his/her first appearance **with effect from II semester** and within the minimum duration of the programme.
- (ii) The award of '**First Class**' is further subject to the candidate becoming eligible for the award of the degree, having passed the examination in all the courses **within 5 years.**
- (iii) The period of authorized break in study (vide clause 14.0) will not be counted for the purpose of the above classification.
- (iv) To be eligible for award of **UG (Hons.) Degree** the student must have earned total of **126 credits (110 regular credits + 12 additional credits offered by their school + 4 Non CGPA credits) and should have 8.0 CGPA, without any history of arrears and should not have secured E, DE, U, in any course, during the entire programme.**
- (v) To be eligible for award of **the respective UG Degree with Minor Specialization**, the student must have successfully earned **126 credits (110 regular credits + 12 Additional credits in Minor Specialisation + 4 Non – CGPA Credits)**

18.0 Transfer of credits

18.1. Within the broad framework of these regulations, the Academic Council, based on the recommendation of the Credit Transfer Committee so constituted may permit students to earn part of the credit requirement in other approved Universities of repute & status in the India or abroad.

18.2 The Academic Council may also approve admission of students who have completed a portion of course work in another approved Institute of repute under lateral entry, based on the recommendation of the credit transfer committee on a case to case basis.

18.3 Admission norms for working Professionals

Separate admission guidelines are available for working / experienced professionals for candidates with the industrial / research experience who desire to upgrade their qualification as per recommendation of Credit Transfer Committee.

19.0 Eligibility for Award of the UG Degree, /UG (Hons.) Degree/ UG Degree with Minor Specialisation

19.1 A student shall be declared to be eligible for award of the respective UG Degree / UG (Hons.) / UG Degree with Minor specialisation if he/she has satisfied the clauses 4.6 / 7.0 / 8.0 respectively within the stipulated time (clause 12, 13).

- a. Earned the specified credits in all the categories of courses (vide clause 4.6) as specified in the curriculum corresponding to the discipline of his/ her study.
- b. No dues to the Institute, Hostels, Libraries etc.; and
- c. No disciplinary action is pending against him / her.

The award of the degree shall be recommended by the Academic Council and approved by the Board of Management of the Institute.

20.0 Change of Discipline

20.1 If the number of students in any discipline of Liberal Arts /Applied Science. class as on the last instructional day of the First Semester is less than the sanctioned strength, then the vacancies in the said disciplines can be filled by transferring students from other disciplines subject to eligibility. All such transfers will be allowed on the basis of merit of the students. The decision of the Vice-Chancellor shall be final while considering such requests.

20.2 All students who have successfully completed the first semester of the course will be eligible for consideration for change of discipline subject to the availability of vacancies and as per norms.

21.0 Power to modify

Notwithstanding all that has been stated above, the Academic Council is vested with powers to modify any or all of the above regulations from time to time, if required, subject to the approval by the Board of Management.

B.Sc – FOOD TECHNOLOGY									
(110 CREDIT STRUCTURE)									
SEMESTER - I									
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	SH	EL2101	English-I	3	0	0	3	0	3
2	BS	CY1105	Applied Chemistry	3	1	0	3	0	4
3	BS	MA1110	Business Mathematics	3	1	0	3	0	4
4	BS	CY1106	Environmental Chemistry	3	1	0	3	0	4
5	BS	CY1141	Applied Chemistry Lab	0	1	3	2	0	4
6	PC	FT1131	Food Chemistry Lab-I	0	1	3	2	0	4
Total				12	5	6	16	0	23
SEMESTER - II									
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	SH	EL2201	English-II	3	0	0	3	0	3
2	PC	FT1201	Food Analysis Techniques	3	1	0	3	0	4
3	PC	FT1202	Principles of Food Science	3	1	0	3	0	4
4	BS	FT1203	Introduction to Biochemistry	3	1	0	3	0	4
5	PC	FT1231	Food Chemistry Lab-II	0	1	3	2	0	4
6	BS	FT1232	Biochemistry Lab	0	1	3	2	0	4
Total				12	5	6	16	0	23

B.Sc – FOOD TECHNOLOGY									
(110 CREDIT STRUCTURE)									
SEMESTER - III									
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	PC	FT1301	Food Microbiology, Contamination and Spoilage of Food	3	1	0	3	0	4
2	PC	FT1302	Processing of Cereals, Fruits, Vegetables & Beverages	3	1	0	3	0	4
3	PC	FT1303	Food and Nutrition	3	1	0	3	0	4
4	PC	FT1304	Food Additives	3	1	0	3	0	4
5	PC	FT1331	Food Microbiology Lab	0	1	3	2	0	4
6	PC	FT1332	Food Chemistry Lab-III	0	1	3	2	0	4
Total				12	6	6	16	0	24
SEMESTER - IV									
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	PC	FT1401	Technology of processing Fish, Meat & Poultry	3	1	0	3	0	4
2	PC	FT1402	Food Preservation Technology	3	1	0	3	0	4
3	PC	FT1403	Food Waste Management	3	0	0	3	0	3
4	PE	FT17**	Elective-I	3	0	0	3	0	3
5	PE	FT17**	Elective-II	3	0	0	3	0	3
6	PC	FT1431	Food Analysis Lab-I	0	1	3	2	0	4
7	PC	FT1432	Food Processing Lab-I	0	1	3	2	0	4
8	PC	FT1433	Internship (minimum 40 hours)	-	-	-	5	0	-
Total				15	4	6	24	0	25

B.Sc – FOOD TECHNOLOGY									
(110 CREDIT STRUCTURE)									
SEMESTER - V									
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	PC	FT1501	Food Process Technology - Milk and Dairy Products	3	1	0	3	0	4
2	PC	FT1502	Bakery, Confectionary and Miscellaneous products	3	1	0	3	0	4
3	PC	FT1503	Food Adulteration and Food Toxicology	3	0	0	3	0	3
4	PE	FT17**	Elective-III	3	0	0	3	0	3
5	PE	FT17**	Elective-IV	3	0	0	3	0	3
6	PC	FT1531	Food Analysis Lab-II	0	1	3	2	0	4
7	PC	FT1532	Food Processing Lab-II	0	1	3	2	0	4
Total				15	4	6	19	0	25
SEMESTER - VI									
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	PC	FT1601	Processing of Oils and Fats	3	0	0	3	0	3
2	PC	FT1602	Fermented Food	3	0	0	3	0	3
3	PE	FT17**	Elective-V	3	0	0	3	0	3
4	PC	FT1631	Project Work	0	0	16	10	0	16
Total				9	0	16	19	0	25
TOTAL CREDITS							110		

LIST OF PROFESSIONAL ELECTIVES WITH GROUPING - SEMESTER WISE									
SEM	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C		TCH
4	PE	FT1701	Food information and Regulations	3	0	0	3		3
4	PE	FT1702	Value Addition to Food Industry Refuse	3	0	0	3		3
4	PE	FT1703	Food Safety	3	0	0	3		3
4	PE	FT1704	Fast Foods and Catering Services	3	0	0	3		3
5	PE	FT1705	Entrepreneurship Development	3	0	0	3	0	3
5	PE	FT1706	Food Quality Testing And Evaluation	3	0	0	3	0	3
5	PE	FT1707	Food Packaging Technology	3	0	0	3		3
6	PE	FT1708	Quality Control and Management	3	0	0	3		3

SEMESTER – I

COURSE TITLE	ENGLISH – I			CREDITS	3
COURSE CODE	EL4101	COURSE CATEGORY	SH	L-T-P-S	3- 0- 0- 0
CIA	50%			ESE	50%
MODULE 1 – EXTENSIVE READING					(7L+2 T)
<p>Reading short meaningful extracts from literary and non-literary texts and identifying various types of connections among statements such as reason-result, statement-illustration, cause-effect, result-reason, addition, contradiction/opposite, introduction, furthering, adding, summing up, conclusion - Tracing the texture of texts – Referencing -- Anaphoric and cataphoric references – Identifying relationships between topic sentences and subordinate sentences</p> <p>Suggested Activities: Reading leading to making notes—Random note making—Systematizing conventions</p>					
MODULE 2 – INTENSIVE READING					(7L+2T)
<p>Matching discourse functions with corresponding linguistic structures – one function carried out through several structures – one structure fulfilling several functions - Cohesion and cohesive markers – Coherence and grammatical linkers -Reading newspapers at breakfast table – Reading publicity materials – Skimming – Reading quickly for grasping the main idea or point – Scanning – Reading carefully, looking for specific information – Railway timetable – medical prescription – textbooks – cover letters accompanying important documents - Reading and Note making – Purposes of note making -- Various formats of making notes – Short forms and abbreviations – commonly used and personal conventions</p> <p>Suggested activities: Non-literary texts for comparison and contrast -- Identifying words, phrases, idioms, phatic communion phrases, formulaic expressions etc. (which suits day to day communication) from reading materials and using them appropriately in one’s own use</p>					
MODULE – 3 : CRITICAL THINKING					(7L+2T)
<p>Identifying differences and similarities between pairs of pictures, illustrations, diagrams etc. and talking about them by working in pairs and small groups - Defining ‘argument’ – Components of an argument: reason and conclusion —illustrating arguments – Identifying arguments from a set of statements and identifying their components</p> <p>Suggested Activities: Developing critical thinking skills through visuals (print and electronic), Choose the best responses from the statements, Group activities, task based activities, responses to hypothetical situations</p>					
MODULE – 4 : ORAL COMMUNICATION SKILLS					(7L+2T)
<p>Functions in clusters: Cluster 1. Inviting, responding with thanks, accepting invitation/declining - invitation with a valid reason, promising to meet on a later occasion, taking leave & bidding farewell - 2. Apologizing, explaining reason, promising not to repeat the mistake, reassuring, taking leave - 3. Correcting someone, defending the right point or stance, convincing the other etc - 4. Greeting, Appreciating something good, illustrating the point further, Complimenting - 5.Complaining, defending logically, demanding things to be set right, and producing proof or evidence - Examples in the form of short recorded extracts of direct interactions as well as telephone conversations from various walks of life such as office work, business, advertisement, law court, police, various service providers such as gas agency, door delivery agency and so on</p>					

Suggested activities:	
Listening to small meaningful chunks of day to day communication and responding to them naturally – Greetings, formulaic expressions etc. Identifying and listing natural ways of functioning in contexts, based on short extracts taken from plays, or dialogues from fiction.	
MODULE - 5 : FUNCTIONAL GRAMMAR (7L+2T)	
Sentence – Parts of Speech – Comparative Adjectives - Pronouns – prepositions – conjunctions – Articles – Non-finite Verbs - tenses – conditionals – question tags – modal verbs – common errors – concord – Reported speech – Active & Passive voice	
Suggested Activities:	
Exercises related to grammatical aspects and its function in functional English (day to day conversations)	
TEXT BOOKS	
1.	Functioning in English Book I & II by Dr. P. Bhaskaran, Emerald Publishers, 2018
REFERENCE BOOKS	
1.	Embark, English for Undergraduates by Steve Hart et al, Cambridge University Press, 2016, edition
2.	English for Life and the Workplace Through LSRW&T skills, by Dolly John, Pearson Publications, 2014 edition
3.	Cambridge Academic English, An integrated skills course for EAP by Martin Hewings and Craig Thaine, by Cambridge University Press, 2014
E BOOKS	
1.	https://www.britishcouncil.in/english/courses-business
2.	http://www.bbc.co.uk/learningenglish/english/features/pronunciation
3.	http://www.bbc.co.uk/learningenglish/english/
4.	http://www.antimoon.com/how/pronunc-soundsipa.htm
5.	http://www.cambridgeenglish.org/learning-english/free-resources/write-and-improve/
MOOC	
1.	https://www.mooc-list.com/tags/english
2.	https://www.mooc-list.com/course/adventures-writing-stanford-online
3.	http://www.cambridgeenglish.org/learning-english/free-resources/mooc/

COURSE TITLE	APPLIED CHEMISTRY			CREDITS	3
COURSE CODE	CY 1105	COURSE CATEGORY	BS	L-T-P-S	3-1-0-0
CIA	50%			ESE	50%
MODULE 1 – CHEMICAL BONDING AND PERIODIC TABLE					(7L+2T)
<p>Characteristics of covalent bond – ionic bond – coordinate bond – Vander waal – hydrogen bond – metallic bond – factors affecting the formation of ionic/covalent compounds – Born Haber cycle – Fajan’s rule – shapes of molecules – bond length – bond order – bond angle – concept of resonance – valence bond theory (hybridization) – VSEPR concept – structure of water.</p> <p>Modern periodic table – classification of elements in periodic table – general properties of s,p,d and f block elements – periodicity in properties of elements – atomic radii – ionic and covalent radii – ionization energy – electronegativity – electron affinity – Lanthanide contraction – inert pair effect.</p>					
MODULE 2– PRINCIPLES AND TYPES OF ORGANIC REACTIONS					(7L+2T)
<p>Concept of functional group – nomenclature and isomerism – homolytic and heterolytic fission – types of reactions – addition – elimination – substitution – rearrangement – examples – resonance vs tautomerism.</p> <p>Aldol condensation – Hoffman bromamide rearrangement – Cannizzaro reaction – Friedel Craft reaction – Pinacol-pinacolone rearrangement – Beckman rearrangement – Orientation in benzene (distribution) reactive intermediates – Carbocation ion, carbanion, free radical, carbenes.</p>					
MODULE 3 –GASES					(7L+2T)
<p>Kinetic theory of gases – derivation of the kinetic gas equation – mean free path collision number and frequency (no derivation) – problems – ideal gas, causes of deviation – Vander waal’s equation, significance of Vander waals constants – critical state, critical constants (their relations) – continuity of state, law of corresponding state – Vander waals equation and critical phenomena – reduced equation of state – liquefaction of gases – methods of liquefaction – intermolecular forces.</p>					
MODULE 4 – CHEMICAL KINETICS					(7L+2T)
<p>Basic terminology – rate – order – molecularity – determination of rate constants for first and second order reactions – general methods to determine the order of a reaction – problems – effect of temperature, pressure, catalyst, activated complex – collision theory of bimolecular reactions – composite reactions – competitive, parallel and consecutive reactions – definition and examples.</p>					
MODULE 5 – ELECTROCHEMISTRY AND PHOTOCHEMISTRY					(7L+2T)
<p>EMF of a cell – galvanic cell – standard electrode potential – types of electrodes – pH & its measurements – acid base titration curve – electrochemical series – buffer solutions.</p> <p>Lambert Beer’s law – law of photochemical equivalence – quantum efficiency – high and low quantum yields – reason for high and low quantum yields – phosphorescence and fluorescence.</p>					
TEXT BOOKS					
F.A. Cotton, G. Wilkinson and P. Gans, Basic Inorganic Chemistry, 3 rd Edition, John Wiley & Sons, 2010.					
R.T. Morrison and R.N. Boyd, Organic Chemistry, 6 th Edition, Prentice Hall, New Delhi, 2001.					
B.R. Puri, L.R. Sharma and Madan S. Pathania, Principles of Physical Chemistry, Vishal Publishing Co, Jalandhar, 2004.					
K.K. Rohatgi-Mukherjee, Fundamentals of Photochemistry, Wiley-Eastern Ltd., New Delhi, 2014.					

COURSE TITLE	ENVIRONMENTAL CHEMISTRY			CREDITS	3
COURSE CODE	CY 1106	COURSE CATEGORY	BS	L-T-P-S	3-1-0-0
CIA	50%			ESE	50%
MODULE 1 – BASICS OF ENVIRONMENTAL CHEMISTRY					(7L+2T)
Definition and explanation - Weighing and preparation of standard solutions, definition of concentration terms – Chemical kinetics - stoichiometric reactions, chemical equilibria, order of reaction – Types of reactions – neutralization, redox, complex – Solubility product.					
MODULE 2 – ATMOSPHERIC AND AQUATIC CHEMISTRY					(7L+2T)
Different layers of atmosphere – Components and classification of atmosphere – Chemistry of particulate matter in atmosphere.					
Chemistry of water – Physical properties, chemical properties – Aquatic chemicals reactions – Properties of aquatic water - DO, BOD, COD; TDS, pH, conductivity – Basics of Colloidal chemistry – Hydrological cycle.					
MODULE 3 – SOIL CHEMISTRY AND NATURAL RESOURCES					(7L+2T)
Chemical composition of earth, metals, minerals, fossil fuels and soils - Physico-chemical characteristics of soil, soil air, soil clays, organic carbon, soil humus and mineralization, cation exchange capacity, soil water solution, Nitrogen cycle, soil acidity and salinity.					
Forest resources: Use and over-exploitation, deforestation, mining, dams and their effects on forests – Water resources: Use and over-utilization of surface and ground water, floods, drought. Food resources: overgrazing, effects of modern agriculture, fertilizer-pesticide problems.					
MODULE 4 – POLLUTANT CHEMISTRY					(7L+2T)
Chemistry of hydrocarbon decay, environmental effects, effects on macro and microorganisms - Pesticides: Classification, degradation, analysis, pollution due to pesticides – DDT and Endosulphan Heavy metals: Toxic effects of Cd, Pb & Hg. Fertilizers: micro and macro nutrients, environmental effects.					
MODULE 5 – ENVIRONMENT POLLUTION					(7L+2T)
Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Solid waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Disaster management: floods, earthquake, cyclone and landslides.					
TEXT BOOKS					
1.	Banerjee SK (2005) Environmental Chemistry, 2nd edition, Prentice-Hall of India, New Delhi.				
2.	BalramPani (2007) Text book of Environmental Chemistry, IK international Pvt. Ltd, New Delhi.				
3.	Dara SS (2005) A Text Book of Environmental Chemistry and Pollution Control, S. Chand & Company, New Delhi.				
4.	De AK (2003) Environmental Chemistry, 5th edition, New Age International (P) Ltd, New Delhi.				
5.	Manahan SE (2009) Environmental chemistry, CRC Press, FL, USA.				

COURSE TITLE	BUSINESS MATHEMATICS			CREDITS	3
COURSE CODE	MA1110	COURSE CATEGORY	BS	L-T-P-S	3-1-0-0
CIA	50%			ESE	50%
MODULE 1 –					(7L+ 2T)
Measure of central tendency – mean, median, mode – Dispersion, Range, Quartile, Deviation, Mean Deviation, Standard Deviation.					
MODULE 2 –					(7L+ 2T)
Correlation- Karl Pearson’s coefficient of correlation- Spearman’s Rank Correlation- Regression lines and coefficients.					
MODULE 3 –					(7L+ 2T)
Sampling Techniques- Types of simple and sampling procedure- Test of significance- Normal, t test (simple problems)					
MODULE 4					(7L+ 2T)
Assignment and Transportation problems (Excluded Modi method).					
MODULE 5					(7L+ 2T)
Basic Accountancy- Need of accountancy- Principles of Accounting- Journal- Ledger- Trial Balance- Final Accounts- Balance sheet- Profit and loss account					
TEXT BOOKS					
	Statistical Methods – S.P. Gupta, Sultan 2000.				
2.	Statistics – Elhance, B.M. Agarwal Books, 2014				
3.	Introduction to Operations Research – Dr. P.R. Vittal, Margham Publications, 2009				
4.	Operations Research – Hira and Gupta, S. Chand, 2015				
5.	Advanced accountancy, R L Gupta & M Radhaswamy, 2017.				
6.	Advanced Accountancy, T.S. Grewell, 2016.				

COURSE TITLE	APPLIED CHEMISTRY LAB			CREDIT	2
COURSE CODE	CY 1141	COURSE CATEGORY	BS	L-T-P-S	0-1-3-0
CIA	80%			ESE	20%
List of Experiments					
1.	Estimation of Hardness in water				6
2.	Estimation of alkalinity in water				6
3.	Estimation of acidity in water				6
4.	Determination of viscosity of a polymer				6
5.	Estimation of nickel in the given solution				6
6.	Estimation of iron by spectrophotometry				6
7.	Estimation of dissolved oxygen by Winkler's method.				6
8.	Determination of COD				3
REFERENCE BOOKS					
1. J.Mendham, R.C. Denney, J.D. Barnes and N.J.K. Thomas, Vogel's Textbook of Quantative Chemical Analysis, 6 th Edition, Pearson Education, 2004.					
2. D.P. Shoemaker and C.W. Garland, Experiments in Physical Chemistry, McGraw Hill,London.					
3. S. Sumathi, Engineering Chemistry Practicals, Dhanam Publications, 2011.					

COURSE TITLE	FOOD CHEMISTRY LAB-I			CREDIT	2
COURSE CODE	FT 1131	COURSE CATEGORY	PC	L-T-P-S	0-1-3-0
CIA	80%			ESE	20%
List of Experiments					
1.	Estimation of reducing sugars				6
2.	Estimation of salt content in brine				6
3.	Estimation of salt content in butter				6
4.	Estimation of starch content				6
5.	To determine detection limit of taste				6
6.	To determine effect of temperature on taste				6
7.	Estimation of acidity of water by titration				6
8.	Estimation of sodium by flame-photometer				3
REFERENCE BOOKS					
1. Connie M. Weaver and James R Daniel, The Food Chemistry Laboratory, 2 nd Edition, CRC Press, 2005.					
2. Owen R. Fenna (Editors), Food Chemistry, 3 rd Edition, Marcel Dekker. Inc., 1996.					

SEMESTER-II

COURSE TITLE	ENGLISH – II			CREDITS	3
COURSE CODE	EL 4102	COURSE CATEGORY	SH	L-T-P-S	3- 0- 0- 0
CIA	50%			ESE	50%
MODULE 1 – COMMUNICATIVE WRITING					(7L+ 2T)
<p>Messages (informal, formal) - Memos - Formal letters of invitation - personal letters of invitation - Writing formal letters (a) business (b) official - Short paragraphs - Describing objects, places, landscapes, people, natural processes, describing processes(man-made) - Expanding short aphorisms, proverbs, quotes, idioms etc. into short paragraphs - Making posters for various occasions such as World Wildlife Day, AIDS Awareness, Anti-Ragging etc.</p> <p>Suggested Activities: Writing (a)Short publicity materials,(b) Brochures (c) user manuals, (d)warranty cards (e) captions</p>					
MODULE 2 – SKILLS FOR ACADEMIC PURPOSES					(7L+ 2T)
<p>Enriching word power -- Language in use -- Listening comprehension -- Group discussion -- Note making -- Intensive reading -- Interpretation-- Interview skills – E mail writing -- Synthesizing information from various sources --Expanding quotes - Job applications — Preparing CV – Preparing the profiles of organizations and institutions — Presentation skills – Effective seminar participation</p> <p>Suggested activities: Preparation and Writing of Slides, Embellishments - Oral presentation - Self Evaluation - Listening and note taking, Identifying hard spots, Framing questions & Raising doubts / Seeking clarifications (Seminar)</p>					
MODULE – 3 : BUSINESS COMMUNICATION (Written)					(7L+ 2T)
<p>Writing project proposals (pre-project stage) — writing project proceedings (while-project stage) — writing project reports (post-project stage) — writing project evaluation — Writing reviews of journal articles — Business correspondence for various purposes such as placing orders, reminding, complaining, notifying damage of consignment and demanding replacement, sales promotion</p> <p>Suggested Activities: writing gist of articles for putting them together in an edited form — Writing transcripts of lectures and speeches on academic interest</p>					
MODULE – 4 : WRITING FOR MEDIA: PRACTICE					(7L+ 2T)
<p>From events to news story — the various stages of development of news reporting – Editing — Basics of editing; (i) At the level of contents & (ii) at the level of language – Advertisements - Electronic media and their advantages and limitations - Proof reading</p> <p>Suggested activities: Identifying and listing natural ways of functioning in contexts, based on short extracts taken from news reading, advertisements, plays, or dialogues from media</p>					
MODULE - 5 : COMPREHENSION STRATEGIES					(7L+ 2T)
<p>Silent reading and testing comprehension skills — Reading aloud and accuracy in pronunciation — Making short speeches before small groups to check fluency — Writing small pieces of discourse meant for day to day communication — Writing short academic pieces for exam purposes — Doing self-check grammar tests to improve grammatical accuracy</p>					

Suggested Activities:	
Reading primary sources—reading secondary sources and supporting the points already gathered from the primary sources	
TEXT BOOKS	
1.	Functioning in English Book I & II by Dr. P. Bhaskaran, Emerald Publishers, 2018
REFERENCE BOOKS	
1.	Embark, English for Undergraduates by Steve Hart et al, Cambridge University Press, 2016, edition
2.	English for Life and the Workplace Through LSRW&T skills, by Dolly John, Pearson Publications, 2014 edition
3.	Cambridge Academic English, An integrated skills course for EAP by Martin Hewings and Craig Thaine, by Cambridge University Press, 2014
E BOOKS	
1.	http://www.bbc.co.uk/learningenglish/english/features/pronunciation
2.	http://www.bbc.co.uk/learningenglish/english/
3.	http://www.antimoon.com/how/pronunc-soundsipa.htm
4.	http://www.cambridgeenglish.org/learning-english/free-resources/write-and-improve/
MOOC	
1.	https://www.mooc-list.com/tags/english
2.	https://www.mooc-list.com/course/adventures-writing-stanford-online
3.	http://www.cambridgeenglish.org/learning-english/free-resources/mooc/

COURSE TITLE	FOOD ANALYSIS TECHNIQUES			CREDITS	3
COURSE CODE	FT 1201	COURSE CATEGORY	PC	L-T-P-S	3-1-0-0
CIA	50%			ESE	50%
MODULE 1 – SAMPLING AND SAMPLING TECHNIQUES					(7L+ 2T)
Statistical tests and Error Analysis: Accuracy, precision, classification of errors- minimization of errors - Sampling and sample treatment– different methods of sampling – factors involved in effective sampling - representative and homogeneous - pre-concentration and pre-dilution.					
MODULE 2 – COMPOSITION ANALYSIS OF FOOD					(7L+ 2T)
Principles of - Moisture and total solids analysis - Ash analysis - Fat analysis - Protein analysis - Carbohydrate analysis - Vitamin analysis - Traditional method of mineral analysis					
MODULE 3 – PHYSICAL ANALYSIS OF FOOD					(7L+ 2T)
Rheological analysis - thermal analysis (TGA, DTA, DSC) – colour analysis.					
MODULE 4 – SPECTROSCOPIC ANALYSIS OF FOOD					(7L+ 2T)
Interaction of radiation with matter – Beer-Lambert’s Law – Estimation of iron, nickel by spectrophotometer – Principle and basic applications of – UV-Visible, Infrared, Mass spectroscopy					
MODULE 5 – SEPARATION TECHNIQUES					(7L+ 2T)
Basic principles of chromatography – TLC – Column chromatography – HPLC - Gas chromatography – Electrophoresis.					
TEXT BOOKS					
1.	Food Analysis, 2nd Edition. S.S. Nielsen, Aspen Publishers, 2010.				
2.	Food Analysis: Theory and Practice. Y. Pomeranz& C.E. Meloan, Chapman and Hall, 2004.				
3.	Analytical Chemistry of Foods. C.S. James, Blackie Academic and Professional, 1995.				
4.	Introduction to Food Analysis, S. Suzanne Nielsen, West Lafayette, IN 47907-2009, USA, n 2009.				

COURSE TITLE	PRINCIPLES OF FOOD SCIENCE			CREDITS	3
COURSE CODE	FT 1202	COURSE CATEGORY	PC	L-T-P-S	3-1-0-0
CIA	50%			ESE	50%
MODULE 1 – COMPOSITION AND NUTRITIVE VALUE OF PLANT FOODS					(7L+ 2T)
Introduction to Nutrients - Carbohydrates, Protein, Lipids, Vitamins, Minerals. Cereals:General outline, Composition & Nutritive value, Structure of wheat and Rice. Millets – ragi, sorghum, maize, finger millet					
MODULE 2 – PULSES & LEGUMES					(7L+ 2T)
Composition, Nutritive value, Anti-nutritional factors. Changes during cooking, Factors affecting cooking time.Germination - Changes during germination. Nuts & Oilseeds: Composition, sources of proteins and oil, Processing of oil seeds - Soya bean, coconut, ground nut and sesame. Protein concentrates and isolates,Texturised vegetable protein.					
MODULE 3 – FRUITS & VEGETABLES					(7L+ 2T)
Composition, Classification, Nutritive value, Vegetable Cookery, Changes during cooking, Ripening, Changes during ripening - Spices: Definition, Classification, Chemical composition, use of spices - Nutritive value of Sugar cookery - Artificial sweeteners.					
MODULE 4 – COMPOSITION AND NUTRITIVE VALUE OF ANIMAL FOODS					(7L+ 2T)
Eggs:Structure, Composition, Nutritive value, Grading Changes during storage. Fish: Composition, Nutritive value. Meat:Structure, Composition, Nutritive value. Poultry- classification, composition and nutritive value					
MODULE 5 – FUNCTIONAL FOOD					(7L+ 2T)
Introduction to Functional foods, Prebiotics, Probiotics, Nutraceuticals. Organic Foods and GM foods					
TEXT BOOKS					
1.	B.Srilakshmi, Food science, New Age International Publishers (India), 2003				
2.	N Shakuntalamanay, M. ShadaksharaSwamy, Foods : Facts and Principles - New Age Publishers, 2004				
3.	M. Swaminathan., Food science, Chemistry & Experimental Foods,BAPPCO (2003)				

COURSE TITLE	INTRODUCTION TO BIOCHEMISTRY			CREDITS	3
COURSE CODE	FT 1203	COURSE CATEGORY	PC	L-T-P-S	3-1-0-0
CIA	50%			ESE	50%
MODULE 1 – INTRODUCTION TO BIOMOLECULES					(7L+ 2T)
Overview - Basic principles of Organic Chemistry, Types of Biomolecules, Chemical nature, Biological role, Biological buffers, Water and its importance in Biochemistry.					
MODULE 2 – STRUCTURES & PROPERTIES OF CARBOHYDRATES, PROTEINS					(7L+ 2T)
Carbohydrates (Mono, Di, Oligo)- forms of Isomerism, Physiological importance, Polysaccharides - Starch- glycogen- Cellulose and their derivatives- Chitin-Peptidoglycons- Glycoaminoglycons- Glycoconjugates, Test for Carbohydrates. Classification of Amino acids and Proteins, Structure of Proteins- Primary-Secondary- Tertiary and Quaternary - Myoglobin & Hemoglobin, Test for Proteins					
MODULE 3 – STRUCTURES & PROPERTIES OF LIPIDS, NUCLEIC ACIDS					(7L+ 2T)
Lipid - Classification (Fatty acids, Glycerolipids, Phospholipids, Glycolipids, Sphingolipids, Steroids) - Physiological importance, Significance of Cholesterol, Nucleic Acids - Structure of Purines - Pyrimidines - Nucleosides - Nucleotides - Ribonucleic acids - Deoxyribonucleic acids - Nucleoprotein complexes, Synthetic Nucleotide analogs, Functions of Nucleotides - Carrier of Chemical energy of cell- Enzyme Cofactor -Regulatory Molecules					
MODULE 4 – NUTRITION & METABOLISM					(7L+ 2T)
Nutrition, Digestion and absorption of Carbohydrates - Lipids - Proteins - Vitamins - Minerals, Vitamins - Biomedical importance - Classifications - Deficiency diseases, Introduction to Biocatalysis by Enzymes and Pathways, Introduction to Biosynthesis and Breakdown of Carbohydrates- Lipids- Proteins and Nucleic Acids.					
MODULE 5 – INTERMEDIARY METABOLISM & BIOENERGETICS					(7L+ 2T)
TCA cycle - Glycolysis - Glyconeogenesis - Pentose phosphate shunt - Urea cycle - Interconnection of Pathways - Metabolic regulations. High energy compounds - Electronegative Potential of compounds, Respiratory Chains- ATP cycle-Calculation of ATP production during Glycolysis and TCA cycle, Regulation of levels of High energy compounds and reducing equivalents inside the cell					
TEXT BOOKS					
1	Lehninger's Principles of Biochemistry by David L. Nelson and Michael M. Cox, Macmillan Worth publisher, 2000.				
2	Lubert Stryer, Biochemistry, 4th Edition, WH. Freeman and co., 2000.				
3	Murray, R.K., Granner, B.K., Mayes, P.A., Rodwell, V.W., Harper's Biochemistry, 2003.				

COURSE TITLE	FOOD CHEMISTRY LAB - II			CREDIT	2
COURSE CODE	FT 1231	COURSE CATEGORY	PC	L-T-P-S	0-1-3-0
CIA	80%			ESE	20%
LIST OF EXPERIMENTS					
1.	Estimation of total sugar (colorimetry)				6
2.	Saponification value of oil				6
3.	Acid value of oil				6
4.	Iodine value of oil				6
5.	Estimation of total fat content in oil				6
6.	Estimation of glycerides in the given oil.				6
7.	Estimation of peroxide value of oil.				3
8.	Determination of acetic acid content in vinegar.				6
REFERENCE BOOKS					
1. J.Mendham, R.C. Denney, J.D. Barnes and N.J.K. Thomas, Vogel's Textbook of Quantative Chemical Analysis, 6 th Edition, Pearson Education, 2004.					
2. D.P. Shoemaker and C.W. Garland, Experiments in Physical Chemistry, McGraw Hill, London.					
3. S. Sumathi, Engineering Chemistry Practicals, Dhanam Publications, 2011.					

COURSE TITLE	BIOCHEMISTRY LAB			CREDIT	2
COURSE CODE	FT 1232	COURSE CATEGORY	PC	L-T-P-S	0-1-3-0
CIA	80%			ESE	20%
LIST OF EXPERIMENTS					
1.	General guidelines for working in biochemistry lab (theory)				3
2.	Units of volume, weight, density and concentration measurements and their range in biological measurements				3
3.	Demonstration of proper use of volume and weight measurement devices				3
4.	Accuracy, precision, sensitivity and specificity (theory)				3
5.	Preparation of buffer –titration of a weak acid and a weak base.				3
6.	Qualitative tests for carbohydrates – distinguishing reducing from non-reducing sugars and keto from aldo sugars.				3
7.	Quantitative method for amino acid estimation using ninhydrin – distinguishing amino from imino acid.				3
8.	Protein estimation by Biuret and Lowry's methods.				3
9.	Protein estimation by Bradford and spectroscopic methods.				3
10.	Extraction of lipids and analysis by TLC.				6
11.	Estimation of nucleic acids by absorbance at 260 nm and hyperchromic effect (demo).				4
12.	Enzymatic assay: phosphatase from potato.				4
13.	Enzymatic assay: estimation of glucose by TGO method after hydrolysis of starch with acid and specificity of the enzymatic method.				4
REFERENCE BOOKS					
1. BIOCHEMISTRY LABORATORY MANUAL, Mark Brandt, Ph.D.Third edition, 2002.					
2. Biochemistry Laboratory Manual For Undergraduates, Gerczei Fernandez, Timea / Pattison, Scott, MARC record for eBook, ISBN 978-3-11-041133-1, 2014					

SEMESTER III

COURSE TITLE	FOOD MICROBIOLOGY, CONTAMINATION AND SPOILAGE OF FOODS			CREDITS	3
COURSE CODE	FT 1301	COURSE CATEGORY	PC	L-T-P-S	3-1-0-0
CIA	50%			ESE	50%
MODULE 1 – INTRODUCTION					(7L+ 2T)
Basic of microbial existence; history of microbiology, classification and nomenclature of microorganism, microscopic examination of microorganisms, light and electron microscopy; principles of different staining techniques like gram staining, acid fast, capsular staining, flagellar staining					
MODULE 2 – MICROBES-STRUCTURE AND MULTIPLICATION					(7L+ 2T)
Structural organization and multiplication of bacteria, viruses, algae and fungi with a special mention of life history of actinomycetes, yeast, mycoplasma and bacteriophage.					
MODULE 3 – MICROBIAL NUTRITION, GROWTH AND METABOLISM					(7L+ 2T)
Nutritional requirements of bacteria and different media used for bacterial culture; growth curve and different methods to quantitate bacterial growth, aerobic and anaerobic bioenergetics and utilization of energy for biosynthesis of important molecules					
MODULE 4 – FOOD POISONING AND CONTROL METHODS					(7L+ 2T)
Microbial food poisoning by Staphylococci, Salmonella of food poisoning group and clostridium botulinum (Botulism). Measures to prevent microbial food poisoning. Food infections - food borne diseases - Dysentries, diarrhoea, Typhoid, Cholera. Physical and chemical control of microorganisms					
MODULE 5 – CONTAMINATION AND SPOILAGE OF FOOD					(7L+ 2T)
Principles of food spoilage by micro-biological, Physical and biological factors. Contamination and spoilage of cereals, meat, fish, poultry, eggs, milk and fermented products					
TEXT BOOKS					
1	Talaron K, Talaron A, Casita, Pelczar And Reid. Foundations In Microbiology, W.C.Brown Publishers, 1993.				
2	Pelczar MJ, Chan ECS and Krein NR, Microbiology, Tata McGraw-Hill Edition, New Delhi, India, 2007.				
3	Prescott LM, Harley JP, Klein DA, Microbiology, 3rd Edition, Wm. C. Brown Publishers, 1996.				

COURSE TITLE	PROCESSING OF CEREALS, FRUITS, VEGETABLES AND BEVERAGES			CREDITS	3
COURSE CODE	FT 1302	COURSE CATEGORY	PC	L-T-P-S	3-1-0-0
CIA	50%			ESE	50%
MODULE 1 – PROCESSING WHEAT AND RICE					(7L+ 2T)
Wheat -Types, milling, flour grade, flour treatments -bleaching, maturing, types of flour for baking, technology of dough development, Macroni products. Rice -Physicochemical properties, milling - mechanical & solvent extraction, parboiling, Rice products and utilization of by-products					
MODULE 2 – PROCESSING OF CEREALS					(7L+ 2T)
Corn - Milling (wet and dry), cornflakes. Barley- Milling, Malting, Processing of beer. Oats - Milling (oatmeal, oatflour& oat flakes). Sorghum, Pearl Millet, finger millet – Milling					
MODULE 3 – TECHNOLOGY OF PULSES					(7L+ 2T)
Red gram, Green gram, Black gram - Milling (Dry & wet), Improved milling method.Anti nutritional factors in pulses.					
MODULE 4 – STORAGE AND HANDLING					(7L+ 2T)
Storage and handling of fresh fruits and vegetables, preservation of fruits and vegetables by heat treatment, production and preservation of fruits and vegetable juices, preservation of fruit juice by hurdle technology, preparation of jam, jelly and marmalade, pickles, vinegar and tomato products					
MODULE 5 – BEVERAGES					(7L+ 2T)
Non-alcoholic beverages, food laws, food rules and standards, statistical quality control, types of packaging, Processing of tea, coffee and cocoa.					
TEXT BOOKS					
1	Kent, Technology of Cereal, 5th Ed. Pergamon Press, 2003				
2	Chakraborty., Post-Harvest Technology of Cereals, Pulses and Oilseeds, revised ed., Oxford & IBH Publishing Co. Pvt Ltd, 2008.				
3	B. Srilakshmi. Food Science, 4th Edition. New Age International Publishers, 2012.				
4	Manay, S. &Shadaksharaswami, M., Foods: Facts and Principles, New Age Publishers, 2004.				

COURSE TITLE	FOOD AND NUTRITION			CREDITS	3
COURSE CODE	FT 1303	COURSE CATEGORY	PC	L-T-P-S	3-1-0-0
CIA	50%			ESE	50%
MODULE 1 – FATS & LIPIDS					(7L+ 2T)
Understanding relationship between food, nutrition and health. Functions of food-physiological, psychological and social. Concept of balanced diet. Lipids - Classification, Composition function - essential fatty acids, deficiency, food sources of EFA, Function of TGL, Characteristics of animal and vegetable fats, sterols - cholesterol - function, food sources, phospholipids - function, ketone bodies - fat requirements - food sources, dietary lipids and their relation to the causation of Atherosclerosis and Ischaemic heart disease.					
MODULE 2 – NUTRIENTS, VITAMINS AND MINERALS					(7L+ 2T)
Nutrients – Classification, Functions, Dietary sources, RDA. Fat soluble vitamins - A, D, E and K. Water soluble vitamins - thiamin, riboflavin, niacin, pyridoxine, folate, vitamin B12 and vitamin C. Minerals- Role of Ca, P, Fe, Na, K, I, F, Se.					
MODULE 3 – CARBOHYDRATES AND PROTEINS					(7L+ 2T)
Proteins - Composition - structure and classification, function of protein, Amino acids Indispensable and dispensable amino acids - special function of amino acids - protein deficiency - Protein Energy Malnutrition - KWASHIORKOR and MARASUMS - etiology, clinical features, treatment and prevention - Evaluation of protein quality - PER, BV, NPU and NPR, chemical score mutual and amino acid supplementation of proteins					
MODULE 4 – BASICS OF ENERGY					(7L+ 2T)
Energy units - Kilocalories, Megajoules, determination of energy value of foods, using Bomb calorimeter, diagram of Bomb Calorimeter - gross calorific values, Physiological energy, value of foods, relation between oxygen used and calorific value					
MODULE 5 – METABOLISM					(7L+ 2T)
Determination of energy requirements, direct calorimetry. Relation between Respiratory quotient and energy output - Specific dynamic action of food (Thermogenic food in REE) indirect calorimetry - Basal metabolism - definition, determination - benedict Roth basal Metabolism Apparatus - factors affecting BMR - determination of energy metabolism, during work - energy requirements for various types of activities, factorial methods for calculation of the daily energy requirements of an adult for varying degrees of physical activity - recommended allowances for calories, energy requirements of adults expressed in terms of reference man and reference woman - FAO committee and ICMR committee percent calories supplied by carbohydrates, fats and proteins in average Indian diets - Energy requirements for different age groups					
TEXT BOOKS					
1	B.Srilakshmi, Food Science, New Age International Publishers (India), 2003.				
2	NIN, ICMR (1990). Nutritive Value of Indian Foods.				
3	Raina U, Kashyap S, Narula V, Thomas S, Suvira, Vir S, Chopra S (2010). Basics Food Preparation: A Complete Manual, Fourth Edition. Orient Black Swan Ltd.				
4	Seth V, Singh K (2005). Diet planning through the Life Cycle: Part 1. Normal Nutrition. A Practical Manual, Fourth edition, Elite Publishing House Pvt.Ltd.				
5	Guthrie H.A. - Introductory Nutrition C.V. Mosby Co. St. Louis, 2006.				

COURSE TITLE	FOOD ADDITIVES			CREDITS	3
COURSE CODE	FT 1304	COURSE CATEGORY	PC	L-T-P-S	3-1-0-0
CIA	50%			ESE	50%
MODULE 1 – INTRODUCTION					(7L+ 2T)
Food additives- definitions, classification and functions, need for food additives, food preservatives, classifications, antimicrobial agents (types, mode of action and their application), safety concerns, regulatory issues in India, international legal issues Nutrient supplements & thickeners, polysaccharides, bulking agents, antifoaming agents, synergists, antagonists.					
MODULE 2 – ANTIOXIDANTS					(7L+ 2T)
Antioxidants (synthetic and natural, mechanism of oxidation inhibition), chelating agents: types, uses and mode of action.					
MODULE 3 – COLOURING AGENTS					(7L+ 2T)
Color retention agents, applications and levels of use, natural colorants, sources of natural color (plant, microbial, animal and insects), misbranded colors, color extraction techniques, color stabilization					
MODULE 4 – FLAVOURING AGENTS					(7L+ 2T)
Flavoring agents: flavors (natural and synthetic flavors), flavor enhancers, flavor stabilization, flavor encapsulation Flour improvers: leavening agents, humectants and sequesterants, hydrocolloids, acidulants, pH control agents buffering salts, anticaking agents, etc.					
MODULE 5 – SWEETENERS					(7L+ 2T)
Sweeteners: natural and artificial sweeteners, nutritive and non-nutritive sweeteners, properties and uses of saccharin, acesulfame-K, aspartame, corn sweeteners, invert sugar sucrose and sugar alcohols (polyols) as sweeteners in food products Emulsifiers: Types, selection of emulsifiers, emulsion stability, functions and mechanism of action. Additives, food uses and functions in formulations; permitted dosages					
TEXT BOOKS					
1	Branen AL, Davidson PM &Salminen S. (2001). Food Additives. 2nd Ed. Marcel Dekker.				
2	George AB. (2006). Encyclopedia of Food and Color Additives. Vol. III. CRC Press.				
3	George AB. (2004). Fenaroli's Handbook of Flavor Ingredients. 5th Ed. CRC Press.				
4	Madhavi DL, Deshpande SS &Salunkhe DK. (2006). Food Antioxidants: Technological, Toxicological and Health Perspective. Marcel Dekker.				
5	Morton ID & Macleod AJ .(2010). Food Flavours. Part A, B & C. Elsevier.				
6	Nakai S &Modler 6. HW. (2000). Food Proteins: Processing Applications. Wiley VCH.				
7	Stephen AM. (2006). Food Polysaccharides and Their Applications. Marcel Dekker				

COURSE TITLE	FOOD MICROBIOLOGY LAB			CREDIT	2
COURSE CODE	FT 1331	COURSE CATEGORY	PC	L-T-P-S	0-1-3-0
CIA	80%			ESE	20%
LIST OF EXPERIMENTS					
1. Laboratory safety and sterilization techniques					4
2. Microscopic methods in the identification of microorganisms					4
3. Preparation of culture media – nutrient broth and nutrient agar					4
4. Culturing of microorganisms – in broth and in plates (pour plates, streak plates, isolation and preservation of bacterial cultures)					4
5. Staining techniques – grams' and differential					4
6. Quantitation of microorganisms.					4
7. Effect of disinfectants on microbial flora					4
8. Isolation and identification of microorganisms from different sources – soil, water and milk					4
9. Antibiotic sensitivity assay					4
10. Growth curve – observation and growth characteristics of bacteria and yeast.					4
11. Effect of different parameters on bacterial growth (ph, temperature & UV irradiation)					5
REFERENCE BOOKS					
1.	Laboratory Manual of Food Microbiology, NeelimaGarg, K. L. Garg, K. G. Mukerji, I. K. International Pvt Ltd, 2010.				
2.	Food Microbiology: A Laboratory Manual, Ahmed E. Yousef, Carolyn Carlstrom, ISBN: 978-0-471-39105-0, 2003.				

COURSE TITLE	FOOD CHEMISTRY LAB-III			CREDIT	2
COURSE CODE	FT 1332	COURSE CATEGORY	PC	L-T-P-S	0-1-3-0
CIA	80%			ESE	20%
LIST OF EXPERIMENTS					
1. Qualitative tests for sugars - glucose, fructose, lactose, maltose and glucose.					3
2. Qualitative estimation of reducing sugar.					3
3. Qualitative tests for proteins.					3
4. Qualitative tests for minerals					3
5. Quantitative estimation of calcium					3
6. Quantitative estimation of phosphorous.					3
7. Quantitative estimation of vitamin C.					3
8. Demonstration Experiments.					
a. Estimation of total nitrogen in foods (Micro or Macrokjeldahl methods)					4
b. Lipid extraction					4
c. Determination of Iodine value					4
d. Estimation of Iron					4
e. Qualitative tests for vitamin A					4
f. Quantitative estimation of Carotene					4
REFERENCE BOOKS					
The Food Chemistry Laboratory: A Manual for Experimental Foods, Dietetics, and Food Scientists, Second Edition, Connie M. Weaver, James R. Daniel, ISBN 9780849312939, 2003.					

SEMESTER-IV

COURSE TITLE	TECHNOLOGY OF PROCESSING FISH, MEAT & POULTRY			CREDITS	3
COURSE CODE	FT 1401	COURSE CATEGORY	PC	L-T-P-S	3-1-0-0
CIA	50%			ESE	50%
MODULE 1 – FISH AND PROCESSING					(7L+ 2T)
Classification of fresh water fish and marine fish, commercial handling, storage and transport of raw fish, average composition of fish, freshness criteria and quality assessment of fish, spoilage of fish, methods of preservation of fish, canning, freezing, drying, salting, smoking and curing.					
MODULE 2 – FISH PRODUCTS					(7L+ 2T)
Production of fish meal, fish protein concentrate, fish liver oil and fish sauce and other important byproducts, quality control of processed fish, fish processing industries in India					
MODULE 3 – MEAT PROCESSING					(7L+ 2T)
Development of meat and poultry industry in India and its need in nation's economy. Psychological and pathological abnormalities. Pale soft exudate muscle. Dark culting beef-pH, Water Holding Capacity (WHC) and ERC. Meat freshness. Quality control assessments.					
MODULE 4 – POULTRY					(7L+ 2T)
Classification of poultry meat, composition and nutritional value of poultry meat & eggs, processing of poultry meat and eggs, spoilage and control, byproduct utilization and future prospects, poultry farms in India					
MODULE 5 – SLAUGHTER PROCESS AND QUALITY MANAGEMENT					(7L+ 2T)
Meat quality -Effects of feed, breed and environment on production of meat animals and their Quality. Meat Quality-color, flavor, texture, Water-Holding Capacity (WHC), Emulsification capacity of meat. Slaughter process: Slaughter, inspection and grading, Anti-mortem examination of meat animals, slaughter of buffalo, sheep/ goat, poultry, pig. A Generic HACCP model, dressing of carcasses, post-mortem examination of meat, different cuts of pork, beef, mutton, chicken.					
TEXT BOOKS					
1	Lawrie R A, Lawrie's Meat Science, 5th Ed, Woodhead Publisher, England, 1998				
2	Parkhurst&Mountney, Poultry Meat and Egg Production, CBS Publication, New Delhi, 1997				
3	Pearson & Gillet Processed Meats, 3 Ed, CBS Publication, New Delhi, 1997				
4	Shai Barbut, Poultry Products Processing, CRC Press 2005				
5	Stadelman W.J, Owen J Cotterill, Egg Science and Technology, 4th Ed. CBS Publication New Delhi, 2002.				
6	Hui Ed., Handbook of Food Products Manufacturing: Health, Meat, Milk, Poultry, Seafood and Vegetables, Volumes 1, 2. Wiley 2007.				

COURSE TITLE	FOOD PRESERVATION TECHNOLOGY			CREDITS	3
COURSE CODE	FT 1402	COURSE CATEGORY	PC	L-T-P-S	3-1-0-0
CIA	50%			ESE	50%
MODULE 1 – INTRODUCTION TO FOOD PRESERVATION					(7L+ 2T)
Objectives and techniques of food preservation, canning, classification of cans, can specification, structure of cans lacquering, canning of food items, thermal process time calculations for canned foods, spoilage in canned foods.					
MODULE 2 – THERMAL PROCESSING AND DRYING					(7L+ 2T)
Thermal Processing Principles & application– Blanching, Pasteurization, Sterilization, Ultra high temp sterilization, Aseptic processing Drying- Significance: Natural drying- Solar drying, Artificial drying- Hot air drying, Drum drying, Spray drying, Dehydrofreezing , Freeze drying Pre treatmentsblanching, sulphuring					
MODULE 3 – FREEZING					(7L+ 2T)
Effect of low temperature on Fresh Fruits, Vegetables, Meat & Fish products, Chill injury. Freezing, Freezing rate Quick freezing, Slow freezing Air blast freezing, Contact freezing, Immerssion freezing, Cryogenic freezing Quality of frozen foods- Retrogradation, Protein denaturation, Freezer burn					
MODULE 4 – IRRADIATION AND FERMENTATION					(7L+ 2T)
Irradiation - Source of ionization irradiation, Dose & Dosimetry, Mode of action, Scope of irradiation. Fermentation - Principles, Types of fermentation, Advantages					
MODULE 5 – CHEMICAL PRESERVATIVES					(7L+ 2T)
Natural preservatives-Mode of action, Chemical preservatives- Sulphur dioxide, , Benzoic acid, Sorbic acid , Antioxidants, Recent Trends - Pulsed electric fields, High pressure technology, Ohmic heating, Microwave heating, Hurdle technology					
TEXT BOOKS					
1.	Food Preservation Techniques, 1st Edition, Peter Zeuthen Leif Bøgh-Sørensen, Woodhead Publishing, 2003				
2.	Food Science by Potler, 1995				
3.	Fruits and Vegetable Processing, WimJongen, Woodhead Publishing, 2002.				
4.	Preservation of Fruits & Vegetables by IRRI, 2015.				

COURSE TITLE	FOOD WASTE MANAGEMENT			CREDITS	3
COURSE CODE	FT 1403	COURSE CATEGORY	PC	L-T-P-S	3-0-0-0
CIA	50%			ESE	50%
MODULE 1 – INTRODUCTION					(7L+ 2T)
Classification and characterization of food industrial wastes from Fruit and Vegetable processing industry, Beverage industry; Fish, Meat & Poultry industry, Sugar industry and Dairy industry; Waste disposal methods – Physical, Chemical & Biological; Economical aspects of waste treatment and disposal.					
MODULE 2 – WASTE FROM FOOD INDUSTRIES					(7L+ 2T)
Treatment methods for liquid wastes from food process industries; Design of Activated Sludge Process, Rotating Biological Contactors, Trickling Filters, UASB, Biogas Plant.					
MODULE 3 – MANAGEMENT OF SOLID WASTES					(7L+ 2T)
Biological composting, drying and incineration; Design of Solid Waste Management System: Landfill Digester, Vermicomposting Pit.					
MODULE 4 – BIOTEATMENT OF WASTES					(7L+ 2T)
Biofilters and Bioclarifiers, Ion exchange treatment of waste water, Drinking-Water treatment, Recovery of useful materials from effluents by different methods.					
MODULE 5 – ENVIRONMENT MANAGEMENT					(7L+ 2T)
Environment management systems (ISO 14000) and its application in food industry; legislation related to waste management; standards for emission or discharge of environmental pollutants from food processing industries.					
TEXT BOOKS					
1	Waste Management for the Food Industries, 1st Edition, Ioannis Arvanitoyannis, 2007				
2	Food Industry Wastes, 1st Edition, Maria Kosseva Colin Webb, Academic Press, 2013.				
3	Food Processing Waste Management: Treatment and Utilization Technology, V.K. Joshi (Editor), 2011.				
4	Environmental Biotechnology: Principles and Applications; Rittmann BE & McCarty PL; 2001, Mc-Grow-Hill International editions.				

COURSE TITLE	FOOD ANALYSIS LAB-I			CREDIT	2
COURSE CODE	FT 1431	COURSE CATEGORY	PC	L-T-P-S	0-1-3-0
CIA	80%			ESE	20%
LIST OF EXPERIMENTS					
1.	Determination of adulterants in spices				5
2.	Total soluble solids in fruits by physical method				5
3.	pH and acidity of juices				5
4.	Brix-Acid ratio				5
5.	Estimation of Ascorbic acid content in juice				5
6.	Examination of extraneous material in foods.				
	a.	Extraneous matter in soft cheese.			5
	b.	Extraneous matter in jam			5
	c.	Extraneous matter in potato chips.			5
	d.	Extraneous matter in citrus juice.			5
REFERENCE BOOKS					
Food Analysis Laboratory Manual - 4th Edition By S. Suzanne Nielsen. Springer Science & Business Media, 2010. ISBN 978-1-4419-1477-4.					

COURSE TITLE	FOOD PROCESSING LAB – I			CREDIT	2
COURSE CODE	FT 1432	COURSE CATEGORY	PC	L-T-P-S	0-1-3-0
CIA	80%			ESE	20%
LIST OF EXPERIMENTS					
1.	Preparation of orange squash.				4
2.	Preparation of mango jam.				4
3.	Preparation of guava jelly.				4
4.	Preparation of tomato ketchup.				4
5.	Preparation of canned peas/ pine apple.				4
6.	Preparation of mango pickle.				4
7.	Preparation of dried carrot.				4
8.	Preparation of frozen prawn.				5
9.	Preparation of sponge cake.				6
10.	Preparation of bread.				6
REFERENCE BOOKS					
Food Analysis Laboratory Manual - 4th Edition By S. Suzanne Nielsen. Springer Science & Business Media, 2010. ISBN 978-1-4419-1477-4.					

SEMESTER - V

COURSE TITLE	FOOD PROCESS TECHNOLOGY – MILK AND DAIRY PRODUCTS			CREDITS	3
COURSE CODE	FT 1501	COURSE CATEGORY	PC	L-T-P-S	3-1-0-0
CIA	50%			ESE	50%
MODULE 1 – PROPERTIES OF MILK					(7L+ 2T)
Definition, composition and nutritive value; factors affecting composition of milk. - chemical properties of milk lipids, milk fat structure, fat destabilization; functional properties of milk lipids, milk proteins, their types, precipitation (casein micellar structure and its aggregation); milk enzymes, milk coagulation; lactose; vitamins and minerals in milk					
MODULE 2 – : PROCESSING OF MILK					(7L+ 2T)
Technology of fluid milk: filtration/clarification, standardization, pasteurization (LTLT, HTST), sterilization, homogenization, UHT processing, aseptic packaging, storage and distribution.					
MODULE 3 – TECHNOLOGY OF RECOMBINED AND RECONSTITUTED MILK					(7L+ 2T)
Technology of milk powders (WMP, SMP): composition, process of manufacture, problems and prevention methods - Technology of Cheese: classification, composition, Nutritive value, process of manufacture of cheddar, mozzarella, cottage and processed cheese, defects (their causes and prevention)					
MODULE 4 – MILK PRODUCTS					(7L+ 2T)
Technology of yogurt, Acidophilus milk, bulgaricus milk, kumiss and kefir. Technology of frozen milk products: composition, process of manufacture, defects (their causes and prevention). Technology of indigenous milk products: dahi, butter, ghee, channa, paneer, khoa etc. Newer concepts in dairy products: cream powder, sterilized cream, butter spread, butter powder, cheese spread, whey protein concentrates, Lactose.					
MODULE 5 – MILK GRADATION					(7L+ 2T)
Grading of milk and criterion of grading, milk adulteration problem, synthetic milk Dairy plant sanitation: hygiene in dairy Industry, different types of cleansing and sanitizing agents, their applications, cleaning systems					
TEXT BOOKS					
1	Sukumar, De (2001). Outlines of Dairy Technology. Oxford University Press.				
2	Smith G. (2003). Dairy processing improving quality. Woodhead Publishers.				
3	Biochemistry of Milk Processing, Y. H. Hui, A. L. Kelly and P. F. Fox, 2007.				
4	Aneja RP, Mathur BN, Chandan RC & Banerjee AK. 2002. <i>Technology of Indian Milk Products</i> . Dairy India Publ.				
5	Rathore NS <i>et al.</i> 2008. Fundamentals of Dairy Technology - Theory & Practices. Himanshu Publ.				
6	Walstra P. (Ed.). 2006. Dairy Science and Technology. 2nd Ed. Taylor & Francis				

COURSE TITLE	BAKERY, CONFECTIONARY AND MISCELLANEOUS PRODUCTS			CREDITS	3
COURSE CODE	FT 1502	COURSE CATEGORY	PC	L-T-P-S	3-1-0-0
CIA	50%			ESE	50%
MODULE 1 – INTRODUCTION TO BAKING					(7L+ 2T)
Bakery ingredients and their functions; Machines & equipment for batch and continuous processing of bakery products					
MODULE 2 – BAKING TECHNIQUES					(7L+ 2T)
Testing of flour; Manufacture of bread, cake and biscuits; Analysis of bakery products; Cake icing techniques, wafer manufacture, cookies and crackers					
MODULE 3 – BAKED PRODUCTS					(7L+ 2T)
Manufacture of bread rolls, sweet yeast dough products, cake specialties, pies and pastries, doughnuts, chocolates and candies; Maintenance, safety and hygiene of bakery plants.					
MODULE 4 –EXTRUDING TECHNOLOGY					(7L+ 2T)
Objectives and importance of extrusion in food product development; Components and functions of an extruder; Classification of extruder; Advantages and disadvantages of different types of extrusion					
MODULE 5 – EXTRUDED PRODUCTS					(7L+ 2T)
Change of functional properties of food components during extrusion; Pre and post extrusion treatments; Use of extruder as bioreactor; Manufacturing process of extruded products; Application of extrusion technologies in food industries.					
TEXT BOOKS					
1	Textbook of Bakery and Confectionery, Ashokkumar Y, PHI, 2012.				
2	The Complete Technology Book on Bakery Products (Baking Science with Formulation & Production)3rd Edition, NIIR Board of Consultants & Engineers, ISBN: 9789381039380, 2014.				
3	hand book of bakery industries (how to manufacture bakery and confectionery products), Author: EIRI Books, ISBN: 9788186732182, 2014.				
4	A Professional Text to Bakery and Confectionary, Kingslee, John J. ISBN : 978-81-224-1749-4, New Age International, 2014.				

COURSE TITLE		FOOD ADULTERATION AND FOOD TOXICOLOGY		CREDITS	3
COURSE CODE	FT 1503	COURSE CATEGORY	PC	L-T-P-S	3-1-0-0
CIA	50%			ESE	50%
MODULE 1 – ADULTERATION					(7L+ 2T)
Introduction to common adulterants and their detection techniques in salts, fats, oil, milk and milk products, spices and condiments, tests for some specific adulterants impact of adulteration and new adulterant.					
MODULE 2 – : INTRODUCTION TO FOOD TOXICOLOGY					(7L+ 2T)
Classification, dose, determinants of toxins in foods; naturally occurring toxins from animals, bacterial and fungal and sea food sources. Risk assessment in food toxicology; laws and regulation of safety assessment of foods including food additives, environmental contaminants, pesticides and antibiotic residues.					
MODULE 3 – TOXIC MATERIALS					(7L+ 2T)
Allergens, toxic constituents and anti-nutritional factors of plant foods (enzyme inhibitors, trypsin and chymotrypsin inhibitor, amylase inhibitor, flatulence causing sugars, hytolectins).					
MODULE 4 –AGRICULTURAL AND INDUSTRIAL CONTAMINANTS					(7L+ 2T)
Pesticides residues in fruits and vegetables, metal contaminants in foods and their toxicity in human body; animal drug residues in food and water, dioxins and related compounds in food; metals such as lead, arsenic and mercury.					
MODULE 5 – FOOD ADDITIVES AS TOXICANTS					(7L+ 2T)
Artificial colors, preservatives, sweeteners; toxicants formed during food processing such as nitrosamines, maillard reaction products acrylamide, benzene, heterocyclic amines and aromatic hydrocarbons and irradiation; risk of genetically modified food, food supplements, persistent organic pollutants, toxicity implications of nanotechnology in food					
TEXT BOOKS					
1	Shibamoto T. and Bjeldanes L., Introduction to Food Toxicology, Academic Press, Inc. San Diego, CA. ISBN 0-12640025-3, 2009.				
2	Deshpande, S.S. (2002). Handbook of Food Toxicology, Marcel Dekker Inc. NY ISBN 0-8247-0760-5.				
3	William H. W., Essentials of Environmental Toxicology. Taylor & Francis, Philadelphia, PA. ISBN 1-56032-470-4				
4	Principles of Food Toxicology, Second Edition, TõnuPüssa, 2013 by CRC Press, ISBN 9781466504103.				
E BOOKS					
http://197.14.51.10:81/pmb/AGROALIMENTAIRE/Introduction%20to%20Food%20Toxicology%20Second%20Edition.pdf					
https://books.google.co.in/books?hl=en&lr=&id=Lq4iw2UtDacC&oi=fnd&pg=PP1&dq=Shibamoto+T.+and+Bjeldanes+L.,+Introduction+to+Food+Toxicology,+Academic+Press,+Inc.+San+Diego&ots=KnsafCB5PI&sig=k-WX2yHwcHGZXi-DXlgCpOjD6iE#v=onepage&q&f=false					
http://www.webpages.uidaho.edu/etox/resources/exams_grades/readings/Hughes-EnvTox_p1-16.pdf					

COURSE TITLE	FOOD ANALYSIS LAB – II			CREDIT	2
COURSE CODE	FT 1531	COURSE CATEGORY	PC	L-T-P-S	0-1-3-0
CIA	80%			ESE	20%
LIST OF EXPERIMENTS					
1.	Determination of starch and pectic substances using different methods.				5
2.	Estimation of sugars using HPLC.				5
3.	Electrophoresis of proteins for their identification.				5
4.	Determination of free fatty acids of GLC.				5
5.	Estimation of antinutritional factors including gossypol, trypsin inhibitor, phytic and etc.				5
6.	Determination of food additives in foods.				5
7.	Detection of adulteration in foods.				5
8.	Estimation of toxins and pesticide in foods.				5
9.	Rheological properties of foods. Estimation of toxin trace analysis				5
REFERENCE BOOKS					
1. Joslyn, M.A. Ed. 1970. Methods in Food Analysis. Academic Press, New York.					
2. King, R.D. Ed. 1978. Developments in Food Analysis Techniques-1. Applied Science, Publishers Ltd., London.					
3. Morris, C.J. and Morris, P. 1976. Separation Methods in Biochemistry 2nd Ed. Pitman, Pub., London.					
4. Plummer, D.T. 1971. An Introduction to Practical Biochemistry. Mc-Graw Hill Pub.Co., New York.					
5. Raghuramulu, N., Madhavan Nair, K., and Kalyanasundaram, S. Ed. 1983. A Manual of Laboratory Techniques. National Institute of Nutrition, ICMR, Hyderabad.					

COURSE TITLE	FOOD PROCESSING LAB – II			CREDIT	2
COURSE CODE	FT 1532	COURSE CATEGORY	PC	L-T-P-S	0-1-3-0
CIA	80%			ESE	20%
LIST OF EXPERIMENTS					
1.	Preparation of dry onion/ chilli/ garlic.			5	
2.	Cultivation of oyster mushrooms.			5	
3.	Manufacture of macaroni by extruder.			5	
4.	Manufacture of potato powder.			5	
5.	Manufacture of ice cream.			5	
6.	Manufacture of Rosogolla and Sandesh.			5	
7.	Manufacture of candid fruits.			5	
8.	Production of dried milk by drum drying			5	
9.	Production of milk powder by spray drying			5	
REFERENCE BOOKS					
1. Food Process Engineering: Theory and Laboratory Experiments, Shri K. Sharma, Steven J. Mulvaney, Syed S. H. Rizvi, ISBN: 978-0-471-32241-2, 1999.					
2. A Food Technology Lab Manual, Aromatic and Medicinal Plants Research Station, Editors: Rashida RAJUVA T. A. and P.P. Joy, 2014.					

SEMESTER-VI

COURSE TITLE	PROCESSING OF OILS AND FATS			CREDITS	3
COURSE CODE	FT1601	COURSE CATEGORY	PC	L-T-P-S	3-0-0-0
CIA	50%			ESE	50%
MODULE 1 – INTRODUCTION					(7L+ 2T)
Pulses & Legumes: Composition, Nutritive value, Anti-nutritional factors. Changes during cooking, Factors affecting cooking time. Germination-Changes during germination. Nuts & Oilseeds: Composition, sources of proteins and oil - Protein concentrates and isolates, texturised vegetable protein.					
MODULE 2 – PROCESSING OF OILS					(7L+ 2T)
Milling techniques: dry milling and wet milling; processing of legumes: soaking, germination, decortication, cooking, fermentation; puffing, roasting and parching; utilization of pulses; protein isolates and concentrates; role of legumes in human nutrition.					
MODULE 3 – PROCESSING OF SOYABEAN AND OTHER PRODUCTS					(7L+ 2T)
Processing and utilization of soyabean for value added products; soy based fermented products; innovative products from pulses and oilseeds; future developments in products and processes; products from legumes and uses: starch, flour, protein concentrates and isolates.					
MODULE 4 – EDIBLE OILS					(7L+ 2T)
Sources of edible oils (groundnut, mustard, soyabean, sunflower, safflower, coconut, sesame and oil from other sources); physio-chemical properties; processing of oilseeds: rendering, pressing, solvent extraction, refining, hydrogenation; factors affecting extraction; packing and storage of fats and oils, changes during storage.					
MODULE 5 – SPECIALITY OIL PRODUCTS					(7L+ 2T)
Margarine, mayonnaise, salad dressing, fat substitutes etc; chemical adjuncts: lecithins and GMS; Nutritional food mixes from oilseeds: processing of oilseeds for food use, protein rich foods, protein enriched cereal food.					
TEXT BOOKS					
1. Edible Oil Processing, 2nd Edition, Wolf Hamm (Editor), Richard J. Hamilton (Editor), GijsCalliauw (Editor), ISBN: 978-1-4443-3684-9, 2013.					
2. Processing and Nutrition of Fats and Oils, Author(s): Ernesto M. Hernandez, Afaf Kamal-Eldin, Print ISBN: 9780813827674, DOI: 10.1002/9781118528761, John Wiley & Sons, Ltd, 2013.					
3. Technology Of Oilseeds Processing, Oils & Fats And Refining, by EIRI Board (Author), 2011					
4. The Chemistry and Technology of Edible Oils and Fats and Their High Fat Products, By G. Hoffmann, Academic Press, 2013.					
E BOOKS					
1.	Processing and Nutrition of Fats and Oils, DOI: 10.1002/9781118528761				
2.	https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=26&cad=rja&uact=8&ved=0ahUKEwiPkoiDkM_XAhUDQ48KHa_yAto4ChAWCFYwDw&url=https%3A%2F%2Fs58403dfe26d80611.jimcontent.com%2Fdownload%2Fversion%2F1308759632%2Fmodule%2F5340621371%2Fn%2Fame%2FFats%2520and%2520oils.pdf&usq=AOvVaw3y6W0mnGS5ALI-am43IE65				

COURSE TITLE	FERMENTED FOOD			CREDITS	3
COURSE CODE	FT 1602	COURSE CATEGORY	PC	L-T-P-S	3-0-0-0
CIA	50%			ESE	50%
MODULE 1 – IMPORTANCE OF FERMENTED FOODS					(7L+ 2T)
Fermentation - Principles, Types of fermentation, Types of fermented foods, Advantages of fermentation. Organisms used for production of fermented food products; Environmental parameters for fermentation process; safety criteria of fermented foods.					
MODULE 2 – BENEFICIAL ASPECTS OF FERMENTATION					(7L+ 2T)
Microorganism involved in Fermentation, Microbial activities with specific role in Fermentation, Significance of Fermentation food in Indian diet, Factors influence growth & Metabolic activities of microbes in food Fermentation.					
MODULE 3 – CEREAL BASED FERMENTED PRODUCTS					(7L+ 2T)
Cereal and legume based fermented products like Bread, Soya Sauce, Koji, Tempeh, Miso, Natto, Tofu, Angkkak; Indian products like Idly, Dosa, Bada, Bori. Alcoholic beverages and vinegar.					
MODULE 4 –VEGETABLES, FISH AND MEAT BASED FERMENTED PRODUCTS					(7L+ 2T)
Different types of pickles like olive cucumber, salt stock and dill pickles, Fish sauce, sausages and Surimi.					
MODULE 5 – DAIRY BASED FERMENTED PRODUCTS					(7L+ 2T)
Cheese, Butter, Yoghurt, Kefir, Koumiss, Srikhand, Cultured butter milk; Whey based fermented products.					
TEXT BOOKS					
1.	Traditionally Fermented Foods: Innovative Recipes and Old-Fashioned Techniques for Sustainable Eating, by Shannon Stonger (Author), 2017.				
2.	Fermented: A Four Season Approach to Paleo Probiotic Foods, by Jill Ciciarelli, Diane Sanfilippo, Publisher: Victory Belt Publishing, Inc., 2013.				
3.	The Art of Fermentation: An In-Depth Exploration of Essential Concepts and Processes from around the World, by SandorEllix Katz and Michael Pollan, Hard Cover, 2012.				

PROFESSIONAL ELECTIVES

COURSE TITLE	FOOD INFORMATION AND REGULATIONS			CREDITS	3
COURSE CODE	FT 1701	COURSE CATEGORY	PE	L-T-P-S	3-0-0-0
CIA	50%			ESE	50%
MODULE 1 – INTRODUCTION TO LAWS AND REGULATIONS					(7L+ 2T)
Objective of Food Laws, Major Food Laws and Regulations of India and Regulation of Food Sanitation.					
MODULE 2 – NATIONAL LAWS					(7L+ 2T)
Prevention of food Adulteration Act (PFA), Fruit Product Order (FPO), Meat Product Order (MPO), Agmark, Bureau of Indian Standards (BIS), Food Safety and Standards Authority of India (FSSAI).					
MODULE 3 – INTERNATIONAL LAWS					(7L+ 2T)
Certification of HACCP, ISO, Codex Alimentarius , FDA, USDA, CARE.					
MODULE 4 – LABELING AND PACKAGING					(7L+ 2T)
Packaging – Functions, Classifications, Material used for packing and laws related to packaging. Labeling – Nutrition Labeling, Labeling provisions in existing food laws.					
MODULE 5 – FOOD ADULTERATION					(7L+ 2T)
Definition – Methods to detect adulterant of various foods.					
TEXT BOOKS					
1	Food Law and Regulation for Non-Lawyers, Authors: Sanchez, Marc, Food Science Text Series, Springer International, 2015.				
2	The Complete Book of Food Counts, 9th Edition: The Book That Counts It All Mass Market Paperback – December 27, 2011, by Corinne T. Netzer (Author).				
3	Food Science, B Srilakshmi, New Age International, 2003.				
E BOOKS					
1.	http://www.springer.com/gp/book/9783319124711				

COURSE TITLE		VALUE ADDITION TO FOOD INDUSTRY REFUSE		CREDITS	3
COURSE CODE	FT 1702	COURSE CATEGORY	PE	L-T-P-S	3-0-0-0
CIA	50%			ESE	50%
MODULE 1 – INTRODUCTION					(7L+ 2T)
Types of food industries, classification of food industry refuse - handling, transportation and storage of industrial refuse – contamination of industrial refuse – effect of contamination and prevention methods – processing methods and processing equipments – their applications.					
MODULE 2 – FRUITS & VEGETABLES					(7L+ 2T)
Production of pectin, ethanol, natural gas, citric acid, activated charcoal, fibre extract from apple pomace, vitamins - Production of citrus oil from peels of citrus fruits; Manufacture of candied peel and pectin from albedo of citrus fruits. Production of single cell protein by the use of potato wastes; Recovery of - Protein from potato starch plant waste.					
MODULE 3 – FISH, MEAT, POULTRY					(7L+ 2T)
Production of fish meal; Fish protein concentrate; Animal feed; Shell product; Glue from seafood processing waste. Texturised fish protein concentrate (marine beef); Utilization of organs and glands of animal as human food. Production of human food from animal blood and blood protein; Marketable products like chitin, chitosan, fertilizer, nutritional enhancer animal feed from shells					
MODULE 4 – CEREALS					(7L+ 2T)
Feed for livestock from wheat and corn bran and germ. Extraction of oil & wax from rice bran, Puffed cereals from broken rice; Starch, modified starch and industrial alcohol from non-usable cereals; Silica from rice husk; Extraction of plolamin (Zein&katirin); Protein from sorghum; Beer spent graining.					
MODULE 5 – DAIRY INDUSTRY AND BEVERAGES					(7L+ 2T)
Fermentation products from whey. Condensed & dried products from whey; Production of lactose and protein from whey; Utilization of tea waste as feed for live stock& poultry.					
TEXT BOOKS					
1	Food Processing By-Products and their Utilization, Anil Kumar Anal (Editor), ISBN: 978-1-118-43288-4, September 2017, Wiley-Blackwell.				
2	Handbook of Waste Management and Co-Product Recovery in Food Processing, Volume 2, A volume in Woodhead Publishing Series in Food Science, Technology and Nutrition, Edited by:K.W. Waldron, ISBN: 978-1-84569-391-6.				
3	Waste Treatment in the Food Processing Industry, Lawrence K. Wang, Yung-Tse Hung, Howard H. Lo, Constantine Yapijakis, CRC Press, 29-Sep-2005.				
E BOOKS					
1	Handbook of Waste Management and Co-Product Recovery in Food Processing, Volume 2, A volume in Woodhead Publishing Series in Food Science, Technology and Nutrition, Edited by:K.W. Waldron, ISBN: 978-1-84569-391-6.				
2	http://download.poultryandmeatprocessing.com/v01/SciPoultryAndMeatProcessing%20-%20Barbut%20-%202018%20Byproducts%20and%20Waste%20-%20v01.pdf				
3	http://www.foodwastenet.org/media/1132/fwn-workshop-16-17-july-2015-programme.pdf				

COURSE TITLE	FOOD SAFETY			CREDITS	3
COURSE CODE	FT 1703	COURSE CATEGORY	PE	L-T-P-S	3-0-0-0
CIA	50%			ESE	50%
MODULE 1 – INTRODUCTION TO FOOD SAFETY					(7L+ 2T)
Introduction to concepts of food quality, food safety, food quality assurance and food quality management; objectives, importance and functions of quality control, Current challenges to food safety.					
MODULE 2 – SAFETY ACT					(7L+ 2T)
Role of national and international regulatory agencies, Bureau of Indian Standards (BIS), AGMARK, Food Safety and Standards Authority of India (FSSAI), Introduction to WTO agreements: SPS and TBT agreements, Codex alimentarius commission, USFDA, International organization for standards (ISO) and its standards for food quality and safety (ISO 9000 series, ISO 22000, ISO 15161, ISO 14000)					
MODULE 3 – SAFETY DURING PROCESSING					(7L+ 2T)
HACCP; Desirable safety features of some food processing equipment; Personal protective equipment; Safety from adulteration of food.					
MODULE 4 –PLANT MAINTENANCE					(7L+ 2T)
Role of maintenance staff and plant operators; Preventive maintenance; Guidelines for good maintenance & safety precautions; Lubrication & lubricants; Work place improvement through '5S'.					
MODULE 5 – PERONAL HYGENE					(7L+ 2T)
Hygiene and sanitation requirement in food processing and fermentation industries; Cleaning, sanitizing & pest control in food processing; storage and service areas.					
TEXT BOOKS					
1	Food Safety Management, A Practical Guide for the Food Industry, Editors: YasmineMotarjemiHuubLelieveld, eBook ISBN: 9780123815057, Hardcover ISBN: 9780123815040, Academic Press.				
2	Food Hygiene, Microbiology & HACCP. S J Forsythe, P R Hayes. Springer, 2012.				
3	Food Safety Handbook, Author(s): Ronald H. Schmidt, Gary E. Rodrick, Published 2003 John Wiley & Sons, Inc., Print ISBN: 9780471210641.				
E BOOKS					
1.	Food Safety Handbook, DOI: 10.1002/047172159X				

COURSE TITLE	FAST FOODS AND CATERING SERVICES			CREDITS	3
COURSE CODE	FT 1704	COURSE CATEGORY	PE	L-T-P-S	3-0-0-0
CIA	50%			ESE	50%
MODULE 1 – CONCEPTS OF FAST FOOD					(7L+ 2T)
Types- trends- general cooking methods of fast foods.Preparation of raw materials. Indian fast foods.South Indian and North Indian Vegetarian and non-vegetarian gravies. General Indian Flavourings. Kadai preparations and tawapreparation.Fried items.					
MODULE 2 – CONTINENTAL COOKERY					(7L+ 2T)
Cooking methods. Ingredients used. Continental fast foods – pizza- burgers-french fries – cutlets – bread preparations- pastas. Role of wine in continental cookery.Fast foods – Nutritional aspects.					
MODULE 3 – EVOLUTION OF CATERING INDUSTRY					(7L+ 2T)
Various types of catering establishments. Classification of hotels.Variou functional departments. Functions of food and beverage service department. Organisation structure. Types of service – water – budget etc.					
MODULE 4 – EATING ETIQUETTES					(7L+ 2T)
Star classification. Specialityrestaurants.Other hospitality industry and career opportunities. Heritage hotels.					
MODULE 5 – FRONT OFFICE – MEANING AND FUNCTIONS					(7L+ 2T)
Guest registration formalities. House keeping. Meaning and functions. Various cleaning procedures in a hotel.					
TEXT BOOKS					
1	Modern Cookery: Vol. 1 & Vo.2, Paperback – 2010, by Thangam E. Philip (Author).				
2	Krishna Arora, Theory of Cookery, Frank Brothers and Company, New Delhi, 2008.				
3	Hotel Housekeeping: A Training Manual, Sudhir Andrews, ISBN 10: 0070655715 / ISBN 13: 9780070655713, Published by Tata McGraw-Hill Education Pvt. Ltd., 2008.				
4	Food Service and Catering Management, Arora, APH Publishing, 2007.				
E BOOKS					
1.	https://watchrovibe.files.wordpress.com/2015/07/hotel-housekeeping-training-manual-sudhir-andrews-pdf.pdf				

COURSE TITLE	ENTREPRENEURSHIP DEVELOPMENT			CREDITS	3
COURSE CODE	FT 1705	COURSE CATEGORY	PE	L-T-P-S	3-0-0-0
CIA	50%			ESE	50%
MODULE 1 – INTRODUCTION					(7L+ 2T)
Entrepreneur & entrepreneurial flair; Classification of small, medium and large scale manufacturing industries; Opportunities of food processing industries in West Bengal.					
MODULE 2 – SCOPE OF ENTREPRENEURSHIP					(7L+ 2T)
Nature, scope and importance of entrepreneurship; business ideas, source of business ideas, feasibility studies, problem solving and decision making.					
Agricultural sector and food processing industry problems and opportunities; self employment need and entrepreneurship in foods sector, project sizing, fund management and enterprise management issues in food entrepreneurship, entrepreneurship development policies of government in food business					
MODULE 3 – PROCEDURE					(7L+ 2T)
Trade license and registration marks; Sources of finance; Selection of land and factory sheds.					
MODULE 4 –EQUIPMENT MANAGEMENT					(7L+ 2T)
Agencies for promotion of food processing industries; Source of machine and equipment.					
MODULE 5 – WRITING PROJECT PROPOSAL					(7L+ 2T)
Preparation of project report; Market feasibility reports; Techno-economic feasibility report on fruits and vegetable processing, bakery and confectionary, mushroom manufacture and soybean processing.					
TEXT BOOKS					
1	Entrepreneurial Development, ISBN Number : 978-93-5097-383-7, Himalaya Publishing House, 2017.				
2	Entrepreneurial Development, S Chand & Co., 2007, by Khanka S.S. (Author)				
E BOOKS					
1.	http://everestpublishinghouse.com/pdf/Everest-Mngt.Price%20List%20(2014-15).pdf				

COURSE TITLE	FOOD QUALITY TESTING AND EVALUATION			CREDITS	3
COURSE CODE	FT 1706	COURSE CATEGORY	PE	L-T-P-S	3-0-0-0
CIA	50%			ESE	50%
MODULE 1 – INTRODUCTION TO QUALITY ATTRIBUTES					(7L+ 2T)
Appearance, flavour, textural factors and additional quality factors – Concept and Importance of Food Appearance, Sensory Assessment of Appearance- panel selection, screening and training; Physical requirement for food appearance, types of sensory test, Appearance Scales.					
MODULE 2 – TASTE					(7L+ 2T)
Introduction, Organs involved in taste perception- tongue, papillae, taste buds, salivary glands mechanism of taste perception. Chemicals responsible for sweet, salt, sour, and bitter taste their structure and chemical dimensions. Factors affecting taste quality, reaction time and factors affecting it. Absolute and recognition threshold taste abnormalities.					
MODULE 3 – OLFACTION					(7L+ 2T)
Introduction and definition, anatomy of nose, mechanism of odour perception. Prerequisites for odour perception, odour classification, chemical specificity of odour. measurement of odour using different techniques primitive, double tube olfactometer, Elseberg techniques, Wenzel's olfactometer, sniffing, merits and demerits of each methods, olfactory abnormalities.					
MODULE 4 –COLOUR					(7L+ 2T)
Introduction to natural and synthetic colours. Functions of colour in foods. Optical aspect of colour, perception of colour, objective evaluation, colour measurement using different systems- Munsell colour system, CIE colour system, qualitative and quantitative analysis of colour, reflectance spectrophotometry and Colorimetry.					
MODULE 5 – TEXTURE					(7L+ 2T)
Introduction, definition and classification of texture profile. Subjective evaluation, phases of oral processing. Objective analysis, rheological methods of texture measurement including rheological models. Measurement of texture in various food groups viz. cereals, dairy, fruits and vegetables, fish, meat and meat products.					
TEXT BOOKS					
1	Principles of Sensory Evaluation of Food, Maynard A. Amerine, Rose Marie Pangborn, Edward B. Roessler, Elsevier, 2013.				
2	Principles of Food Chemistry, DeMan, 3rd edition, Springer, 2007.				
3	Meilgard, Sensory evaluation Techniques, 3rd ed CRC Press LLC, 2010.				
4	Yeshajahu Pomeranz & Clifton E. Meloan, Food Analysis & Theory & Practice, 1st Indian ed. CBS Publisher & Distributors, New Delhi, 2002.				
5	John B. Hutchings, Food Colour & Appearance, 2nd ed; Springer Publications, 2010.				

COURSE TITLE	FOOD PACKAGING TECHNOLOGY			CREDITS	3
COURSE CODE	FT 1707	COURSE CATEGORY	PE	L-T-P-S	3-0-0-0
CIA	50%			ESE	50%
MODULE 1 – INTRODUCTION TO FOOD PACKAGING					(7L+ 2T)
Definition, factors involved in the evolution and selection of a food package, functions of food packaging (containment, protection, convenience and communication). Paper and paper based packaging materials: types of paper (Kraft, bleached, greaseproof, glassine), paper products (paper bags, cartons, drums and molded paper containers), functional properties of paper; testing of paper packaging materials.					
MODULE 2 – PLASTIC PACKAGING MATERIALS					(7L+ 2T)
Classification of polymers, functional and mechanical properties of thermoplastic polymers; processing and converting of thermoplastic polymers (extrusion, blow molding, injection molding, compression molding, lamination and heat sealing); testing of plastic packages. Packaging requirements of selected foods- cereal and snack food, beverages, milk and dairy products, poultry & eggs, red meat, frozen foods, horticultural products and microwavable foods.					
MODULE 3 –METAL PACKAGING MATERIALS					(7L+ 2T)
Container making processes (end manufacture, three-piece can manufacture and protective and decorative coatings); functional properties of metal containers; Tin plate containers- quality control tests.					
MODULE 4 –GLASS PACKAGING MATERIAL					(7L+ 2T)
Composition and manufacture of glass containers; glass container nomenclature; glass containers-closure functions, closure terminology and construction; properties of glass containers – mechanical, thermal and optical properties; testing of glass containers.					
MODULE 5 – ASEPTIC PACKAGING OF FOODS					(7L+ 2T)
Sterilization of packaging material food contact surfaces & aseptic packaging systems; active food packaging – definition, scope, physical and chemical principles involved. Edible films and coatings– use of edible active layers to control water vapor transfer, gas exchange, modification of surface conditions with edible active layers. Oxygen absorbents – classification, factors influencing the choice of oxygen absorbents, Ethanol vapor: ethanol vapour generator, uses of ethicap for shelf-life extension of food, effect of ethanol vapour on food spoilage/food poisoning bacteria, and advantages and disadvantages of ethanol/vapour generators.					
TEXT BOOKS					
1.	Robertson, G.L.(2006). Food Packaging: Principles and Practice (2nd ed.), Taylor & Francis				
2.	Food Packaging Technology Handbook. NIIR Board, National Institute of Industrial Research, 2003				
3.	Ahvenainen, R. (Ed.) Novel Food Packaging Techniques, CRC Press, 2003.				
4.	Han, J.H. (Ed.) Innovations in Food Packaging, Elsevier Academic Press, 2005				
5.	Robertson, G.L.(2006). Food Packaging: Principles and Practice (2nd ed.), Taylor & Francis				

COURSE TITLE	QUALITY CONTROL AND MANAGEMENT			CREDITS	3
COURSE CODE	FT 1708	COURSE CATEGORY	PE	L-T-P-S	3-0-0-0
CIA	50%			ESE	50%
MODULE 1 – FOOD QUALITY					(7L+ 2T)
Introduction to food quality management - Definition, quality concepts, quality, quality perception, quality attributes, safety, health, sensory, shelf life, convenience, extrinsic attributes, factors affecting food quality. Total food quality management functions.					
MODULE 2 – FOOD CONTAMINATION					(7L+ 2T)
Contamination in Food:- Physical, Natural toxins, chemical, heavy metals, antibiotics, dioxins, environmental pollutants. Contaminants formed during processing nitrosamines, acrylamide, contaminants form packaging materials.					
MODULE 3 – FOOD ADDITIVES					(7L+ 2T)
Meaning, Need, Classification, Characteristics and classification of food additives. Antimicrobial agents – Nitrites, sulphides, sulphur di oxide, sodium chloride, hydrogen peroxide. Antioxidants - Introduction, mechanism of action, natural and synthetic anti-oxidants, technological aspect of antioxidants. Sweeteners- Introduction, importance, classification- natural and artificial. Colors- Importance, classification- natural, artificial colours					
MODULE 4 –FOOD SAFETY					(7L+ 2T)
GRAS (Generally Recognised as Safe). Permissible limit for Food additives. ADI, LD50. Food labelling.					
MODULE 5 – FOOD LAWS, STANDARDS AND REGULATIONS					(7L+ 2T)
National and International Food laws & regulations: FSSAI, FPO, PFA, AGMARK, BIS, ISI, HACCP, USFDA, EU, Codex alimentarius. World Trade Organization- Sanitary and Phyto Sanitary agreement, Technical Barriers in Trade, Tinned foods -Standards of Identity, Standards of Quality.					
TEXT BOOKS					
1	Pieterneel A, Luning, Willem J. Marcelis, Food Quality Management Technological and Managerial principles and practices, Wageningen, 2009.				
2	Food Quality Assurance: Principles and Practices, InteazAlli, 2003 by CRC Press				
3	Total Quality Assurance for the Food Industries, 1st Edition, WA Gould, ISBN: 9781845696009, Woodhead Publishing, 2001.				
E BOOKS					
1.	http://cst.ur.ac.rw/library/Food%20Science%20books/batch1/Food%20Processing%20Technology%20Principles%20and%20Practice,%20Second%20Edition/contents.pdf				