Detailed Syllabus (CBCS) and Bye Laws
M Tech Food Technology
School of Interdisciplinary Sciences and Technology
Jamia Hamdard, New Delhi-110062

DEPARTMENT OF FOOD TECHNOLOGY

http://jamiahamdard.edu/Department/Department_FacultyList.aspx?nDeptID=mc

I. About the Department

The Department of Food Technology promotes education and research in Food Sciences, Food Safety, Packaging, Food Product Development, Food Engineering, Bakery, Meat, Dairy sciences and many more. The department provides opportunities to researchers and academicians having specific expertise to cross the boundaries of their respective subject areas and think across them. It encourages researchers to pool their approaches and modify them so that they are better suited to the problems at hand. The department is currently offering B. Tech., M. Tech. in Food Technology & PhD. in Food Technology and Interdisciplinary Sciences. The Department of Food Technology received a substantial grant of Rs. 75 lakhs in 2010 from Ministry of Food Processing Industries to strengthen the laboratories and infrastructure of the Department. As the demand of professionals and trained personnel in the food industry as well as in research and development in government and industrial set-up is immense. The department has funding for research projects from UGC, AICTE, SERB etc. The Department of Food Technology has also been awarded with DST- FIST Grant of Rs 1.5 crore in 2022.

II. Facilities

The Department is well equipped with processing and analytical equipments and is in the process of procuring many more equipments to make the state of the art facilities. Great emphasis is laid on practical for processing of foods and for analyzing their quality. List of some major equipments available with department and University are as follows: HPLC, Texture Analyser, Rheometer, Hunter Lab Color, Spectrophotometer, UV-Vis Spectrophotometer, Motic Inverted Microscope, Deep Freezer, Moisture analyser, Freeze dryer, BOD Incubator, Rotary Vacuum Evaporator Biohazard Safety Cabinet, Lab. Scale Spray Drier, Tray Drier, Fluidized Bed Drier, Oven, Meat Processing Unit, Bakery lab, Food Juice Processing Equipments, Packaging Equipments, Hammer Mill, Ball mill, Laboratory Pasteurizer, Shrink Packaging Machine, Vacuum Packaging Machine, Viscometer, Infra-red moisture meter, Fruit Crasher, etc.

III. Research Activities

No. of papers published in the year 2016-22: 70+

No. of current Ph.D. scholars: 20

IV. Faculty and Area of Interest

Prof. Farhan Jalees Ahmad
Dean, School of Interdisciplinary Sciences and Technology (SIST)
Jamia Hamdard, New Delhi-62

Dr. Sayeed Ahmad
Associate Professor & Head

Prof. M. Muthukumarappan
Adjunct Faculty

Dr. Vasudha Sharma
Assistant Professor

Dr. Kulsum Jan
Assistant Professor

Er. Jinku Bora
Assistant Professor

Dr Sweta Joshi
Assistant Professor

Dr Khalid Bashir
Assistant Professor

Er. Aastha Bhardwaj
Lecturer

Faculties	Areas of Interest
Prof. Farhan J Ahmad Dean, SIST, Jamia Hamdard	Nanotechnology, Formulation development, Drug delivery, Nanomedicine, Pharmacology
Dr. Sayeed Ahmad, Head	Pharmacognosy, Quality Control of Herbal drugs and Botanicals: Chromatography, Metabolomics, HPLC, HPTLC, GCMS, LCMS
Dr. Vasudha Sharma Assistant Professor	Probiotics, Fermented Functional Foods, Nutraceuticals, By-product utilization, food safety, food fermentation.
Dr. Khalid Bashir Assistant Professor	Starch and Protein Modification, Food Rheology, Drying technology, Food fortification, Probiotics, Powder engineering.
Dr. Sweta Joshi Assistant Professor	Food Chemistry, Functional foods, Nutraceutical, phytochemicals, extraction techniques, food additives, bioactive components, nanotechnology.
Dr. Kulsum Jan Assistant Professor	Cereal processing, Edible films, agricultural waste utilization, by-product utilization, starch and protein modification.
Er. Jinku Bora Assistant Professor	Food Engineering, Food Biotechnology, Food Chemistry, Starch modification, Nanotechnology
Er. Aastha Bhardwaj Lecturer	Food Packaging, Nutraceuticals, Functional Foods, dairy technology

V. Publications

For the publication details kindly go through the below links, for the individual faculty members.

S. No.	Faculty Name	Profile details
1.	Dr Sayeed Ahmad	Google scholar: https://scholar.google.co.in/citations?user=euGiwo4AAAAJ&hl=en JH website: http://jamiahamdard.edu/Department/Department_FacultyProfile.aspx?nID=ckka&nDeptID=ge
2.	Dr Khalid Bashir	Google scholar: https://scholar.google.co.in/citations?user=vet13fEAAAAJ&hl=en JH website: http://jamiahamdard.edu/Department/Department_FacultyProfile.aspx?nID=iqm&nDeptID=mc
3.	Dr Sweta Joshi	Google scholar: https://scholar.google.com/citations?hl=en&authuser=2&user=N5PsbCkAAAAJ JH website: http://jamiahamdard.edu/Department/Department_FacultyProfile.aspx?nID=iqq&nDeptID=mc
4.	Dr Vasudha Sharma	Google scholar: https://scholar.google.co.in/citations?user=fLe_AG4AAAAJ&hl=en JH website: http://jamiahamdard.edu/Department/Department_FacultyProfile.aspx?nID=iqs&nDeptID=mc\
5.	Dr Kulsum Jan	Google scholar: https://scholar.google.co.in/citations?user=iGNPXxAAAAAJ&hl=en JH website: http://jamiahamdard.edu/Department/Department_FacultyProfile.aspx?nID=iqo&nDeptID=mc
6.	Er. Jinku Bora	Google scholar: https://scholar.google.co.in/citations?user=IPqwYRQAAAAJ&hl=en JH website: http://jamiahamdard.edu/Department/Department_FacultyProfile.aspx?nID=isa&nDeptID=mc
7.	Er Aastha Bhardwaj	Google scholar: https://scholar.google.com/citations?user=auhdk0EAAAAJ&hl=en JH website: http://jamiahamdard.edu/Department/Department_FacultyProfile.aspx?nID=isg&nDeptID=mc

VI. Programme Code: 538

VII. VISION AND MISSION STATEMENTS

Vision Statement: To create an atmosphere for quality education, research and entrepreneurship in the field of food processing.

Mission Statements:

MS1: To mainstream department of food technology into the Food Processing sector.

MS2: To produce professionally competent, proficient and highly skilled professionals in the field of food technology capable of working as food technologists, research scientists, quality controllers and entrepreneurs.

MS3: To create an environment capable of conducting internationally acclaimed research with a global reputation for excellence.

MS4: To emphasize upon a transformed partnership based on symbiosis between industry and academia is vital for both ends.

VIII. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

After completion of the M. Tech (Food Technology), the post graduates will be able to:

PEO1: Apply knowledge in solving industry-relevant programs.

PEO2: Carry out quality research in different facets of the program including higher education.

PEO3: Foster abilities to design and fabricate new products or techniques, benefiting the society at large.

PEO4: Combine practical knowledge and abilities with research ability for a better output.

PEO5: Inculcate entrepreneurial skills in aspiring Food Technology professionals

PEO6: Develop leadership skills to be applied in R&D, production and other facets of the profession.

Mapping Program Educational Objectives (PEOs) with Mission Statements (MS)

	MS-1	MS-2	MS-3	MS-4
PEO-1	3	3	3	3
PEO-2	3	3	3	3
PEO-3	3	3	3	3
PEO-4	3	3	3	3
PEO-5	3	3	3	3
PEO-6	3	3	3	3

Level of Mapping: '3' is for 'high-level' mapping, 2 for 'Medium-level' mapping, 1 for 'Low-level' mapping.

IX. PROGRAMME SPECIFIC OUTCOME (PSO)

After completion of the M. Tech (Food Technology), the post graduates will be able to:

PSO1: Analyse diverse areas of the food industry like manufacturing, R&D, quality assurance, intellectual property rights and regulatory affairs.

PSO2: Determine entrepreneurship abilities in the field of production, R&D, new product development, marketing and sales.

PSO3: Contend as a food technologist, researcher, food safety officers, teachers in in the public and private organizations.

X. PROGRAM OUTCOMES (POs)

After going through the two years Master Program in Food Technology, post graduates will exhibit the ability to:

PO1: Practical Knowledge: Use knowledge of the fundamental elements in sync with updated technologies, tailored food technological application and regulatory requirements pertaining to the development of innovative food products.

PO2: Research and development: Apply skills to generate novel food products and relevant products. Utilize software tools and computer bases programing for research oriented developments.

PO3: Problem investigation: Encourage the problem solving skills observed through practical developments along with meeting the set regulations by applying the concept of critical thinking and in-depth analysis.

PO4: Modern tool usage: Use latest product optimization tools along with statistical analysis during the novel product development.

PO5: Communication: Develop valued credentials, reports and effective presentation. Improve communication skills and the ability to successfully carry out responsibilities related to the development of knowledge in accordance with the demands of the academia and industry.

PO6: Professional identity: Create a profession that is dedicated to providing quality services that exceed the stakeholder's expectations like customers, industries, academia, regulatory bodies and to give direction and contribute to the improvement of services and technologies.

PO7: Leadership skills: Organize and execute the objectives related to research and development within a set timeline. Nurturing the skills from the beginning to manage and utilize the available resources judiciously.

PO8: Planning abilities: Implement the knowledge and **s**kills for proper planning and running different steps which are involved in the time bound deliverables like R&D, production, regulatory submissions and product life cycle management.

PO9: Ethics: Show a high level of morality, honesty and integrity. Implement ethical principles when drawing conclusions and accept responsibility for the consequences if any.

PO10: Environmental sustainability: Uutilise expertise to resolve environmental pollution, harmful industrial waste, along with wastage and also improve manufacturing processes while maintaining the sustainability practices.

PO11: Life-long learning: Engage in self-governing and ongoing learning in response to evolving needs and scientific advances. Using input from other professionals and

identifying learning needs for life-long learning improvement. Recognize the importance of conferences, seminars, and workshops in the advancement of knowledge.

Mapping of Program Outcomes (POs) and Program Specific Outcomes (PSOs) with Program Educational Objectives (PEOs)

	PEO-1	PEO-2	PEO-3	PEO-4	PEO-5	PEO-6
PO-1	3	3	2	3	2	2
PO-2	3	2	3	3	3	3
PO-3	3	3	2	3	3	3
PO-4	2	2	3	3	2	3
PO-5	2	3	2	3	3	3
PO-6	3	2	3	2	3	3
PO-7	3	2	2	3	3	2
PO-8	3	2	2	2	3	3
PO-9	2	2	3	3	2	3
PO-10	3	2	2	3	2	2
PO-11	3	3	3	3	3	3
PSO-1	3	3	3	3	3	3
PSO-2	3	3	3	3	3	3
PSO-3	3	3	3	3	3	3

Level of Mapping: '3' is for 'high-level' mapping, 2 for 'Medium-level' mapping, 1 for 'Low-level' map.

CONSOLIDATED SEMESTER WISE PROGRAMME DETAILS

Tables-I: Schemes for internal assessments and end semester examinations semester wise

Semester 1

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks	Credit points
		Continuous mode	Sessional Exams		Total	Marks	Duration		
			Marks	Duration					
	Orientation Programme								
MFTC-101	Food Chemistry and Microbiology	10	15	1 Hr	25	75	3hr	100	3
MFTC-102	Food Processing and Preservation	10	15	1 Hr	25	75	3hr	100	3
MFTC-103	Meat Fish and Poultry Technology	10	15	1 Hr	25	75	3hr	100	3
MFTC-104	Advances in Cereal, Pulses & Oilseeds	10	15	1 Hr	25	75	3hr	100	3
MFTC-105	Food Engineering	10	15	1 Hr	25	75	3hr	100	3
MFTC-106	Lab-I	20	30	3 Hr	50	100	6hr	150	8
MFTD-107	Engineering Properties of Foods	10	15	1 Hr	25	75	3hr	100	3
MFTD-108	Unit Operations in Food Processing	10	15	1 Hr	25	75	3hr		
MFTG-109	Plantation Crops and Spices	10	15	1 Hr	25	75	3hr	100	3
MFTG-110	Fruits and Vegetable Processing	10	15	1 Hr	25	75	3hr		
MFTC-111	Industrial Visit	20	30	1 Hr	50	-	-	50	1
Total								900	30

Semester II

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks	Credit points
		Continuous Mode	Sessional Exams		Total	Marks	Duration		
			Marks	Duration					
MFTC-201	Research Methodology	10	15	1 Hr	25	75	3hr	100	3
MFTC-202	Bakery & Confectionery Technology	10	15	1 Hr	25	75	3hr	100	3
MFTC-203	Food Safety & Quality Management	10	15	1 Hr	25	75	3hr	100	3
MFTC-204	Dairy Technology and Engineering	10	15	1 Hr	25	75	3hr	100	3
MFTC-205	Functional Food and Nutraceuticals	10	15	1 Hr	25	75	3hr	100	3
MFTC-206	Lab-II	20	30	3 Hr	50	100	6hr	150	8
MFTD-207	Food Rheology and Microstructure	10	15	1 Hr	25	75	3hr	100	3
MFTD-208	Advances in Drying Technology	10	15	1 Hr	25	75	3hr		
MFTG-209	Advances in Food Packaging Technology	10	15	1 Hr	25	75	3hr	100	3
MFTG-210	Modern Techniques In Food Analysis	10	15	1 Hr	25	75	3hr		
MFTC-211	Industrial Visit/Educational Tour	20	30	1 Hr	50	-	-	50	1
Total								**900**	**30**

Semester III

Course code	Name of the course	Internal Assessment				End Semester Presentation		Total Marks	Credit points
		Continuous Mode	Presentation/report		Total	Marks	Duration		
			Marks	Duration					
MFTC-301	Industrial Training/Status Report	100	100	1 hr	200	150	1 hr	**350**	**17**
Total								**350**	**17**

Semester IV

Course code	Name of the course	Internal Assessment				End Semester Presentation		Total Marks	Credit points
		Continuous Mode	Presentation/report		Total	Marks	Duration		
			Marks	Duration					
MFTC-401	Project Dissertation	100	150	1 hr	250	150	1 hr	**400**	**18**
Total								**400**	**18**

XI. RULES AND REGULATIONS

1. **Short Title and Commencement**

   These regulations shall be called as "The Revised Regulations for the Master of Technology (M. Tech) Degree Program – Choice Based Credit System (CBCS). They shall come into effect from the Academic Year 2022 onwards. The regulations framed are subject to modifications from time to time by the authorities of the university.

2. **Minimum qualification for admission:**

   Applicants seeking admission M. Tech. Food Technology must appear in the Entrance Test conducted by Jamia Hamdard each year in the month of May, and fulfill the following criteria:

   "A candidate desirous of admission to the course must have passed B. Tech/M.Sc. in Food Science and Technology or allied disciplines including the Bachelor's degree in Pharmacy with at least 55% marks in aggregate"

3. **Duration of the program:**

   Two years spread over four semesters. M. Tech. Food Technology is a two-year full time academic program of study spread over four semesters. A candidate enrolled in M. Tech. Food Technology shall not be allowed to enroll for any other full-time programme of study and shall not appear in any other examination of a full time course of Jamia Hamdard (JH) or any other university. Each year, new session will start in July, and the four semesters will be as under:

Semester I	(1st year)	July-Dec (Odd Semester)
Semester II	(1st year)	Jan-Jun (Even Semester)
Semester III	(2nd year)	July-Dec (Odd Semester)
Semester IV	(2nd year)	Jan-Jun (Even Semester)

   The number of teaching days in each semester shall not be less than 90 days.

4. **Medium of instruction:**

   Medium of instruction and examination shall be in English.

5. **Working days in each semester**

   Each semester shall consist of not less than 90 working days. The odd semesters shall be conducted from the month of June/July to November/December and the even semesters

shall be conducted from the month of December/January to May/June in every calendar year.

7. Minimum credit requirements:

The minimum credit points required for the award of M. Tech. degree is 95

8. Academic work

A regular record of attendance both in Theory, Practical, Seminar, Assignment, Journal club, Discussion with the supervisor, Research work presentation and Dissertation shall be maintained by the department / teaching staff of respective courses.

9. Course Structure:

a. The course, as approved by the Board of Studies and reviewed regularly, shall be divided into no less than seven theory courses in Semester I, II and thesis/project in Semester III and IV. There may be 7 theory courses of at least 3 credits each and a lab course of 8 credits in first two semester

b. A minimum of three credits shall be assigned for each theory paper and 8 for the lab work (practical). The lab work may also include a report or industrial visit.

c. One of the papers of at least 3 credits each in semester I and II will be discipline centric elective course offered in the main subject of study, and a student shall have a choice of two papers each to choose from.

d. One of the papers of at least 3 credits each in semester I and II will be Generic elective course which could be chosen from any discipline or subject.

e. One theory credit will be counted as 50-60 min of teaching per week, and two practical hours will be counted as 1 credit per week.

f. There shall be no less than 30 credits for I and II Semesters and no less than 17 and 18 credits for III and IV semester respectively. This includes the lab work also.

g. There shall be a project/thesis work in the third and fourth semester instead of the theory papers. The credit to this course (thesis) should not exceed the maximum limits set for the number of credits in a semester. The thesis work shall include the experimental work on a specified topic and submission of the thesis towards the end of the Semester IV. The project work/thesis shall be evaluated as per the guidelines proposed by the Board of Studies

and specified into the syllabus. For the project work/thesis, the Head of the Department/Program Coordinator shall convene a meeting of all teachers of the Department and assign appropriate number of students to each teacher to act as supervisor for the project work. The student in consultation with the supervisor shall select a topic for the project work under the intimation to the Head of the Department/Program Coordinator in writing. The project/thesis work may be carried out in any institute/industry/university other than JH as well. The evaluation of the dissertation, project presentation and viva voce for 3rd SEM will be conducted in presence of Head nominated faculty/external examiner while for 4th SEM the evaluation will be conducted by an external examiner approved through BoS. The project shall comprise of the two components namely **Internal and External**. Internal will be assigned 200 (for III SEM) and 250 (for IV SEM) marks and will comprise of submission of a project report after completion of the project. External will be assigned 150 (for III & IV SEM) and will comprise of a presentation on the topic of his/her project work carried out in department/industry/institute/research Centre and viva voce examination.

h. The project report of the fourth semester shall comprise the following three components:

1) Each student will undertake a project work in the fourth semester under the supervision of either faculty member from Jamia Hamdard or an expert from industry/ institute research centre and under the overall supervision of Dean and Head of the faculty. After the completion of project each student has to submit a project report before the deadline proposed for the same.
2) Each student will deliver their research work in two phases; **Phase 1:** The presentation will be evaluated by the internal faculty members and in **Phase 2**: the same presentation will be evaluated by an external examiner on the date and time fixed for the purpose.
3) The topic for the IV Semester project dissertation shall be finalized in the III Semester in consultation with the respective supervisor.

4) The Thesis should be submitted strictly as per the format.

i. A student shall have to score minimum pass marks (40%) of the total marks for each paper.

10. Attendance

a. 100% attendance is desirable, but 75% attendance is mandatory in each paper for a student to enable him to appear in the Semester examination Table 2. In unforeseen contingencies, on the recommendation of the Dean of the Faculty/competent authority, 5% relaxation in attendance may be considered. This 5% condoning may be on account of sickness, provided the medical certificate, duly certified by a Registered Medical Practitioner/Public Hospital had been submitted in the office of the Head of the Department/Program Coordinator at the time of rejoining the classes immediately after the recovery from illness. Head of the Department/Program Coordinator shall forward such cases along with all related documents to the Dean. The relaxation may not be considered as the right of the student.

b. In order to maintain the attendance record of a particular course, a roll call will be
taken by the teacher in every scheduled lecture and practical class. For the purpose of attendance, each practical class will count as one attendance unit, irrespective of the number of contact hours. Attendance on account of participation in the prescribed and notified activities such as, NCC, NSS, Inter-university sports, educational tours/field work, shall be granted provided the participation of the student is duly verified by the officer-in-charge and is sent to the Head of the Department/Program Coordinator within two weeks of the function/activity etc.

c. The subject teacher shall consolidate the attendance record for lectures and practical at the end of each month and submit to the Head of the Department/Program Coordinator. At the end of the semester, the teacher shall consolidate the attendance record for the whole semester and submit it to the Head of the Department/Program Coordinator. The statement of attendance of students shall be displayed by the Head of the

Department/Program Coordinator on the Notice Board. A copy of the same shall be preserved as record. Attendance record displayed on the Notice Board shall deem to be a proper notification for the students and no individual notice shall be sent to any student.

d. If a student is found to be continuously absent from the classes without any information for a period of 30 days, the concerned teacher shall report the matter to the Head of the Department/Program Coordinator who will report the matter to the Dean for appropriate action that may include striking off the name of such student(s) from the roll. Such a student may, however, apply for re-admission within 7 days from the date of issue of the notice of striking off the name from the rolls. Such a student may, however, apply for re-admission within 7 days from the date of issue of the notice of striking off the name. The request for re-admission may be considered by the Dean of the Faculty. Such a student shall not be eligible for re-admission after the prescribed period of 7 days. The re-admission shall be effected only after the payment of prescribed re-admission fee.

e. A student detained on account of shortage of attendance in any semester may be re- admitted to the same class in the subsequent academic year on payment of prescribed fees applicable in that year to complete the attendance requirement of that course.

Table 2:Guidelines for the allotment of marks for attendance

Percentage of Attendance	Theory	Practical
>90	5	10
86 – 90	4	7.5
81 – 85	3	5
75 – 80	2	2.5
Less than 75	0	0

11. Internal assessment

The performance of the student in each paper will be evaluated both continuously (Internal Assessment) and at the end of semester (Semester Examination). 25% marks for each theory paper will be allocated for internal assessment and 75% marks will be kept for semester examination at the end of each semester Table 3. For a paper carrying 100 marks, for example, 25% marks (= 25 marks) allocated for internal assessment will be divided as follows: There will be (i) **three sessional tests** for each paper, each of 5 marks, totalling 15 marks, (ii) an assignment of 3 marks, and (iii) 5 marks will be allocated to attendance as per the guidelines provided by the Office of the Controller of Examination. For practical courses, 50 marks will be allocated for the internal assessment and 100 marks will be kept for semester examination at the end of each semester. For the evaluation of the lab work, laboratory notebook, practical test/viva voce shall be taken into account. The marks shall be awarded by the respective teacher conducting the practical course. For sessional test, discontinuance of classes will not be permitted and the teacher may take the test in his/her schedule class. Under the compelling circumstance such as sickness of the student or mourning in the family the candidate may be given another chance. For sickness only a credible medical certificate issued by a hospital shall be considered. In case of causalities a letter from the parents would be required.

Table 3: Scheme for awarding internal assessment: Continuous mode

Theory	
Criteria	**Maximum Marks**
Attendance (Refer Table – 2)	5
Student – Teacher interaction	2
Assignment	3
Exam	15
Total	25
Practical	
Attendance (Refer Table – 2)	10
Based on Practical Records.	10
Exam/ internal viva voce	30
Total	50

12. Semester examination:

a) Semester examination shall be held at the end of each semester as per schedule given in the Academic Calendar of the Faculty.

b) Up to maximum of seven days preparatory holidays may be given to the examinees before the start of the semester examinations.

c) Each theory paper having 03 credits shall be of 100 marks out of which 75% marks shall be for semester examination and 25% marks for internal assessment.

d) Each practical paper having 08 credits shall be of 150 marks out of which 75% marks shall be for semester examination and 25% marks for internal assessment.

e) The question paper for semester examinations shall be set either by the external examiner or an internal examiner. The Board of Studies of a department shall draw a panel of name of examiners, both internal and external, for approval by the concerned authorities. If the external examiner is unable to send the question paper by the deadline set by the examination branch of the University, the Head of the Department after consultation with the examination branch shall get the paper set internally by a faculty. The papers set by the examiners can be moderated in consultation with the teacher who taught that course. Teachers appointed on contractual basis with appointment of less than one academic session, may not ordinarily be appointed as examiners. All such teachers, however, will be expected to assist in the practical examination.

f) The question paper shall have five questions. There shall be one question from each of the 4 units of the course and one question shall contain objective type/short answer questions covering all the units of the course. The candidate shall have to answer all the five questions. There shall, however, be internal choice within a unit. The choice shall be given by setting alternative questions from the same unit. The question paper should be such that it covers all the topics of that course.

g) The duration of the semester examination of a theory course shall be three hours. Practical exams of a lab course shall be of at least four hours duration. The practical examination shall be conducted by an internal and external examiner assisted by other teachers.

h) For projects, each student shall submit three typed bound copies of his/her project work to the supervisor(s) by the end of the 4th semester. A student

shall not be entitled to submit the project report unless he/she has pursued project work during 4th semester under the guidance of a duly appointed supervisor(s). The report shall embody the candidates own work and an up-to-date review of the subject area. The write-up shall detail a critical assessment of the subject area and indicate in what respect the work appears to advance the knowledge of the subject concerned and future course of investigation required.

i) The project report shall be examined by a Board of Examiners and the student shall have to appear for viva-voce. The Board of Examiners shall consist of the following,
    - One external examiners
    - Head of the Department/Program Coordinator
    - Supervisor(s)

The Board shall examine the project report of all the students and award the marks. A presentation by the student and the viva-voce shall be conducted by one of the external examines along with the other members of the board by and marks shall be awarded by the external examiner for the same. All other teachers of the department will also be invited by the Head of the Department to be present during the examination. In case a student fails to secure the minimum pass marks, he/she may be asked to appear in the viva-voce again, or he/she may be asked to revise the project report in the light of the suggestions of the examiners and resubmit. For this, he/she will have to enroll as an ex-student in the next session. A resubmitted project report will be examined as above and viva voce shall be conducted along with other students.

13. Classification of result:

Following grading system with 10 point scale shall be followed to represent performance of the students in the examination:

%age marks	Grade	Grade Point	Performance level
>80	A^+	10	Outstanding
75- <80	A	9	Excellent
70-<75	B^+	8	Very good
60-<70	B	7	Good
50-<60	C	6	Average
45-<50	D	5	Below Average
40-<45	E	4	Marginal
<40	F	0	Fail
Absent	I	-	Incomplete

If a candidate does not write a paper, He/She will be awarded "I" grade. To pass the course, the student must obtain a minimum of 'E' grade. Minimum CGPA required for the award of degree shall be 5.

12. Earned credits (EC):

The credits for the courses in which a student has obtained E (minimum passing grade for a course) or a higher grade in the semester exam shall be counted as credits earned by him/her. Any course in which a student has obtained 'F' or 'I' grade shall not becounted towards his/her earned credits.

13. Evaluation of Performance:

SGPA (Semester Grade Point Average) shall be awarded on successful completion of each semester. CGPA or Cumulative Grade Point Average, which is the Grade Point Average for all the completed semesters at any point in time shall be awarded in each

semester on successful completion of the current semester as well as all of the previous semester. In 1st semester, CGPA is not applicable.

14. Calculation of SGPA and CGPA of A Student in a Semester:

$$SGPA = \frac{\Sigma \text{ (Earned Credits X Grade Point)}}{\Sigma \text{ (Total Course Credits in a Semester)}}$$

$$CGPA = \frac{\Sigma_{j=1}^{m} \text{ (Earned Credits X grade point)}}{\Sigma \text{ (Total course Credit in a Semester)}}$$

where m is the number of semesters passed

15. Promotion

a) Promotion from 1st semester to 2nd semester and from 3rd semester to 4th semester shall be automatic (provided 40% subjects are cleared).

b) A student shall be promoted to the 3rd semester of the programme if he/she has passed in each theory and practical courses separately of 1st and 2nd semesters. Provided that student has secured 40% marks.

A candidate will be given a total number of 2 attempts, inclusive of the first attempt, to clear the papers in which he/she fails. For such students, promotion to the next higher class will be considered subject to rules relating to passing the 1st and 2nd semester examinations within two academic years, Award of degree shall be subject to successfully completing all the requirements of the programme of study within four years from admission. A student who fails in theory papers of end semester examination may be given a chance to appear in 3 papers in Make-up test to clear those papers. In no case shall it be allowed to the students who abstain from appearing in the semester examination.

c) Candidates who are unable to appear in the examination because of serious illness at the time of examinations may be give another chance. The request has to be processed through the Head of the Department to the Vice Chancellor. The Vice chancellor may look into the merit of the case and decide accordingly.

16. Classification of Successful Candidates:

The result of successful candidates who fulfill the criteria for the award of M. Tech. shall be classified after the 4th semester, on the basis of his/her CGPA of all the four semesters. Classification shall be done on the basis of following criteria:

a) S/he will be awarded "Ist Division" if his/her final CGPA is 6.75 or above

b) S/he will be awarded "2nd Division" if his/her final CGPA is 6 or above but less than 6.75

c) S/he will be awarded "Pass" if his/her final CGPA is 5 or above but less than 6.

d) S/he will be treated as "fail" if his/her final CGPA is less than 5

17. Span Period:

a. 1st and 2nd Semester Exams: Within two years from the first admission to the programme

b. All requirement of M. Tech. degree within a total period of four years from the date of their first admission.

18. Improvement:

A candidate who wishes to improve the previous performance will be allowed to do so as per the following regulation:

a) A student shall be allowed only once to reappear in the semester examination of up to four theory courses along with regular students of that semester to improve upon the previous performance. The examination fee charged from such candidates shall be double the current examination fee.

b) Such a student shall inform the Head of the Department in writing of his/her intention to improve the performance two months before the date of semester examination is to be held.

c) If the student improves the performance, he/she shall be required to submit the earlier mark-sheet/degree. A new mark-sheet and degree shall be issued. The new mark-sheet/degree shall bear the year in which the student improved the grade.

d) In case the grade obtained in improvement is lower than the one obtained earlier, the higher grade shall be retained.

DETAILED SYLLABI OF M. TECH. (FOOD TECHNOLOGY) FIRST YEAR

Table 4: Course distribution

SEMESTER– I (July-Dec)

S. No.	Paper Code	Paper Category	Paper Title	Marks	L	P	T	Credits
			Orientation Programme					
1.	MFTC-101	Core	Food Chemistry and Microbiology	100	3			3
2.	MFTC-102	Core	Food Processing and Preservation	100	3			3
3.	MFTC-103	Core	Meat Fish and Poultry Technology	100	3			3
4.	MFTC-104	Core	Advances in Cereal, Pulses & Oilseeds	100	3			3
5.	MFTC-105	Core	Food Engineering	100	3			3
6.	MFTC-106	Core	Lab-I	150		16		8
7.	MFTD-107	Discipline Specific Elective	Engineering Properties of Foods	100	3			3
8.	MFTD-108		Unit Operations in Food Processing					
9.	MFTG-109	Generic Specific Elective	Plantation Crops and Spices	100	3			3
10.	MFTG-110		Fruits and Vegetable Processing					
11.	MFTC-111	Compulsory	Industrial Visit	50				1
Total				900	21	16		30

SEMESTER – II (Jan-May)

S. No.	Paper Code	Paper Category	Paper Title	Marks	L	P	T	Credits
1.	MFTC-201	Core	Research Methodology	100	3			3
2.	MFTC-202	Core	Bakery & Confectionery Technology	100	3			3
3.	MFTC-203	Core	Food Safety & Quality Management	100	3			3
4.	MFTC-204	Core	Dairy Technology and Engineering	100	3			3
5.	MFTC-205	Core	Functional Food and Nutraceuticals	100	3			3
6.	MFTC-206	Core	Lab-II	150		16		8
7.	MFTD-207	Discipline Specific Elective	Food Rheology and Microstructure	100	3			3
8.	MFTD-208		Advances in Drying Technology					
9.	MFTG-209	Generic Specific Elective	Advances in Food Packaging Technology	100	3			3
10.	MFTG-210		Modern Techniques In Food Analysis					
11.	MFTC-211	Compulsory	Industrial Visit/Educational Tour	50				1
	Total			900	21	16		30

SEMESTER –III (July-December)

S. No.	Paper Code	Paper Title	Marks	L	T	P	Credits
1.	MFTC-301	Industrial Training/Status Report	Internal: 200 External: 150		2	30	17
	Total		350				17

SEMESTER IV [Jan-May]

S. No.	Paper Code	Paper Title	Marks	L	T	P	Credits
1.	MFTC-401	Project Dissertation	Internal: 250 External: 150		3	30	18
	Total		400				18

Total Credits: 30+30+17+18 = 95

Total Marks: 900 + 900 + 350 + 400 = 2550.

Table-5: Semester wise credits distribution

Semester	Credit Points
I	30
II	30
III	17
IV	18
Total credit points	95

1. Student is required to opt for one Discipline specific elective course of at least 03 credits each in semester I and Semester II.
2. Student is required to opt for one Generic elective course of at least 03 credits each in semester I and Semester II from any discipline/subject of his or her choice offered in any department of the university including his or her own department towards ward of M. Tech. in Food Technology.
3. A Core Course offered in any discipline/department may be treated as an elective by the students of other disciplines/departments and such electives will also be referred to as Generic electives.
4. A Discipline specific elective paper will be taught in the department if at least 5 students of the ongoing batch opt for it.
5. A Generic elective course will be taught in the department if more than 5 students opt for it.

DETAILED SYLLABUS

Name of the Academic Program: M. Tech Food Technology

FIRST YEAR

CORE SUBJECT **SEMESTER I**

Paper Title: Food Chemistry & Microbiology
Paper Code: MFTC-101
Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Understand the ~~of~~ carbohydrate chemistry, chemistry of proteins and lipids in foods and their interaction with other food components (*Cognitive level: Understand*)

CO2: Understand the stability aspects of vitamins, minerals and flavour volatiles during food processing (*Cognitive level: Understand*)

CO3: Understand the concept of Probiotics and prebiotics and discuss the functionality of food additives and their application in food industry. (*Cognitive level: Understand*)

CO4: Gain insight on the principles and procedures involved in inactivating/killing microorganisms in foods/Hurdle technology

CO5: Understand the factors affecting food spoilage and apply procedures for identification of the genera and species of microorganisms responsible for the food quality and safety. (*Cognitive level: Understand and apply*)

CO6: Understand the characteristics of foodborne, waterborne and spoilage microorganisms, and methods for their isolation, detection and identification (*Cognitive level: Understand and analyse)*

CO7: Determine the effects of fermentation in food production and its influence on the microbiological quality and status of the food product.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	1	2	1	3	2	3	3	3	3	3	3	1	3
CO2	1	2	2	1	3	3	3	3	3	2	3	3	3	3
CO3	1	1	1	1	3	3	3	3	2	1	3	3	3	3
CO4	3	3	3	1	3	3	3	3	1	2	3	3	3	3
CO5	3	1	2	1	2	3	3	3	3	1	3	3	3	3
CO6	3	3	3	1	3	3	3	3	3	1	3	3	2	3
CO7	1	1	1	2	3	2	3	2	3	3	3	3	3	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

UNIT I

Introduction: Factors affecting microbial growth. Contamination, spoilage and preservation of fruit and vegetables, meat, egg, dairy products etc. Beneficial microorganisms and their utilization in food fermentation of bread, malt beverages, vinegar, fermented vegetables, fermented dairy and meat products. Food borne diseases, Rapid Methods of Detection of food borne pathogens. Mycotoxins.

Unit- II

Probiotics and prebiotics. Basics of Fermentation: Types of fermentors and applications-batch and continuous processes. Application of enzyme in food industries: milk and cheese industry, baking industry, alcoholic beverages (wine and beer) and fruit juices, starch and sugar industries.

Unit-III

Carbohydrates: Types, Functions, Reactions and properties; interactions of sugars and their role in various aspects of food like flavor, colour, aroma and taste; Enzymatic and Non enzymatic browning.

Lipids: Types, functions, reactions and properties: Lipolysis, Auto-oxidation, Rancidity, Role of food lipids in flavour

Proteins: Types, Functions, physical and chemical properties of proteins; Chemical reactions and interactions of amino acids and proteins; Denaturation and its implications.
Water in Foods, Ice: Structure, Properties, Interactions, Water activity, and stability.

Unit-IV

Vitamins, Minerals: General sources, functions and dietary requirements, deficiency symptoms, Stability and degradation in foods during processing. Enrichment and fortification. Food additives: definitions, classification, functions, Types; Flavour technology: Types of flavours, flavours generated during processing, stability of flavours during food processing, essential oils and oleoresins.

References:

1. Banawart GJ. Basic Food Microbiology. 2nd Ed. AVI Publ.

2. Frazier J & Westhoff DC. Food Microbiology. 4th Ed. McGraw Hill.
3. Garbutt J. Essentials of Food Microbiology. Arnold Heinemann.
4. Jay JM, Loessner MJ & Golden DA. Modern Food Microbiology. 7thEd. Springer
5. Chakrabarty MM. Chemistry and Technology of Oils and Fats. Prentice Hall.
6. Dendy DAV & Dobraszczyk BJ. Cereal and Cereal Products. Aspen.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam (30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks).

CORE SUBJECT **SEMESTER I**

Paper Title: Food Processing and Preservation

Paper Code: MFTC-102

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Understand the importance, scope and status of food preservation in India (Cognitive level: Understand)

CO2: Understand the food processing and preservation techniques employing high and low temperatures (Cognitive level: Understand)

CO3: Apply the principles of thermal and non-thermal preservation methods to preserve foods (Cognitive level: Apply)

CO4: Analyse the modern techniques and advances in food processing (Cognitive level: Analyse)

CO5: Apply the modern techniques and advances in food processing (Cognitive level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	1	1	2	1	1	1	3	3	1	3	2	3
CO2	3	3	2	2	3	1	3	3	1	3	1	2	1	3
CO3	3	3	3	1	3	2	3	3	1	3	1	2	1	3
CO4	2	3	3	2	2	2	2	3	1	1	1	3	1	3
CO5	3	3	3	2	2	2	2	3	1	1	1	3	3	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

UNIT-I Introduction to Food Processing and Preservation

Status of food preserving industry in India, National food processing policy of India, Importance and scope of food preservation, Principles of food processing and preservation.

UNIT-II Processing in High and Low Temperature

Processing and preservation by heat: blanching, pasteurization, sterilization and ultra high temperature (UHT), canning, extrusion processing, dielectric heating, microwave heating, baking, roasting and frying; Processing and preservation by low-temperature: refrigeration, freezing, controlled atmospheric storage and modified atmosphere.

UNIT-III Modern Processing Techniques – I

Membrane technology: microfiltration, ultrafiltration, nanofiltration and reverse osmosis and their industrial application, Supercritical fluid extraction, Radio frequency heating, Oscillating Magnetic Field, Ohmic heating, Infrared heating, Induction heating.

UNIT-IV Modern Processing Techniques - II

High Hydrostatic Pressure, Pulsed electric field, Ultrasound, Cold Atmospheric Plasma, High intensity light or Pulsed Light, Ultra Violet Light, Ozone in Food Processing, Food Irradiation, Electron beam Technology, Nanotechnology in food industry.

Suggested readings

1. Arsdel WB, Copley MJ & Morgan AI. Food Dehydration. 2nd Ed. Vols. I, II. AVI Publ.
2. Desrosier NW & James N. Technology of Food Preservation. 4th Ed AVI. Publ.
3. Fellows PJ. Food Processing Technology: Principle and Practice. 2nd Ed. CRC.
4. Jelen P. Introduction to Food Processing. Prentice Hall.
5. Potter NN & Hotchkiss Food Science. 5th Ed. CBS.
6. Potty VH & Mulky MJ. Food Processing. Oxford & IBH.
7. Ramaswamy H & Marcotte M. Food Processing: Principles and Applications. Taylor & Francis.
8. Shafiur Rahman M, Handbook of Food Preservation, 2nd edition, CRC.
9. Gould GW, New Methods of Food Preservation, Springer

Teaching-Learning Strategies in brief

1. The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.
2. **Assessment methods and weightages in brief**
3. *There are two components of assessment:* Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),
4. Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam (30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.
5. Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

CORE SUBJECT **SEMESTER I**

Paper Title: Meat, Fish and Poultry Technology

Paper Code: MFTC-103

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Understand the major biochemical reactions that affects the quality of meat and meat products.

CO2: Characterize and utilize by-products from poultry, fish and meat industries. Composition from different meat sources.

CO3: Understand the Operational factors affecting meat, poultry and Fish quality

CO4: Get to know about the status of Poultry industry in India

CO5: Understand the GAP and HACCP and Packaging of meat products.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1	1	2	2	1	1	1	1	2	3	2	1	3
CO2	2	2	2	3	1	1	1	1	2	2	3	2	2	3
CO3	3	3	2	3	2	1	1	2	2	3	3	3	2	3
CO4	2	3	2	3	2	2	1	2	2	3	3	3	2	3
CO5	3	1	1	2	2	1	1	1	1	2	3	2	1	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

Unit –I

Meat: composition from different sources; Muscle structure and composition; Postmortem muscle chemistry; Meat colour and flavours; Meat microbiology and safety; Modern abattoirs, Stunning methods.

Unit- II

Steps in slaughtering and dressing; Operational factors affecting meat quality; effects of processing on meat tenderization; Halal, jhatka and kosher meat processing. Chilling and freezing of carcass and meat, Cold storage, freezing and preservation. Canning, cooking, drying, pickling, curing and smoking; Prepared meat products salami, kebabs, sausages, sliced, minced, corned.

Unit-III

Poultry industry in India; Microbiology of poultry meat; Spoilage factors; Layout, sanitation and processing operations of poultry processing. Byproducts: eggs, egg products; Whole egg powder and egg yolk products: manufacture, packaging and storage.

Unit-IV

Fish: structure and composition, post mortem changes, rigor mortis, autolytic changes, bacteriological changes, rancidity, physical changes

Meat plant hygiene: GAP and HACCP; Packaging of meat products, Packaging of poultry products, refrigerated storage of poultry meat.

References:

1. Forrest JC. Principles of Meat Science. Freeman.
2. Govindan TK. Fish Processing Technology. Oxford & IBH.
3. Hui YH. Meat Science and Applications. Marcel Dekker.
4. Kerry J. et al. Meat Processing. Woodhead Publ. CRC Press.
5. Levie A. Meat Hand Book. 4th Ed. AVI Publ.
6. Mead M. Poultry Meat Processing and Quality. Woodhead Publ.
7. Mead GC. Processing of Poultry. Elsevier.
8. Pearson AM & Gillett TA. Processed Meat. 3rd Ed. Chapman & Hall.
9. Stadelman WJ & Cotterill OJ. Egg Science and Technology. 4th Ed. CBS.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising

of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam (30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

CORE PAPER **SEMESTER I**

Paper Title: Advances in Cereal, Pulses and Oilseeds

Paper Code: MFTC-104

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Understand the composition, structure and storage of food grains. Cognitive level: Understand

CO2: Understand the technology of wheat, paddy, corn and pseudo-cereal processing and their products. Cognitive level: Understand

CO3: Understand the traditional and modern milling operations of wheat and technology of bakery and extruded products. Cognitive level: Understand

CO4: Understand the processing of coarse cereals and legume-pulses and their value-added products. Cognitive level: Understand, analyse and apply.

CO5: Understand the processing of oil & oilseeds and utilization of their byproducts. Cognitive level: Understand

CO6: Analysis of physicochemical properties of food grains and production of extruded and bakery products. Cognitive level: Understand and analyse

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1	1	2	2	1	1	1	1	2	3	2	1	3
CO2	2	2	2	3	1	1	1	1	2	2	3	2	2	3
CO3	3	3	2	3	2	1	1	2	2	3	3	3	2	3
CO4	2	3	2	3	2	2	1	2	2	3	3	3	2	3
CO5	3	1	1	2	2	1	1	1	1	2	3	2	1	3
CO6	3	3	2	3	2	1	1	2	2	3	3	3	3	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

UNIT-I

Wheat: Structure, Milling; types of wheat, Wheat-based baked products: Bread, biscuit, cakes; Extruded products: pasta, noodles; Rice: structure, milling, parboiling, By-products of rice milling, Technology of breakfast cereals: Puffed Rice, flaked rice; Corn: Wet and dry milling; Corn products: Corn flakes, corn syrup and corn starch. Quality aspects of different flours.

UNIT- II

Sorghum, pearl millet, finger millet, and kodo millet: structure, composition; milling and malting; barley: milling and malting; Oats: Milling and processing.

UNIT -III

Legumes: Structure, composition and processing, Milling of pulses. Legume-based products; anti-nutritional factors; utilization of pulses.

UNIT- IV

Oilseed: Structure; processing: traditional and modern methods of oil extraction, refining, bleaching, deodorizing, hydrogenation; Applications of different oils and fats in food processing and products.

Suggested Reading:

1. Chakrabarty MM. Chemistry and Technology of Oils and Fats. Prentice Hall.
2. Dendy DAV & Dobraszczyk BJ. Cereal and Cereal Products. Aspen.
3. Hamilton RJ & Bhati A. Fats and Oils - Chemistry and Technology.App. Sci. Publ.
4. Kent NL. Technology of Cereals. 4th Ed. Pergamon Press.
5. Kulp K & Ponte GJ. Handbook of Cereal Science and Technology. 2nd Ed. Marcel Dekker.
6. Lorenz KL. Handbook of Cereal Science and Technology. Marcel Dekker.
7. Mathews RH. Legumes Chemistry, Technology and Human Nutrition. Marcel Dekker.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam (30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

CORE PAPER **SEMESTER I**

Paper Title: Food Engineering

Paper Code: MFTC-105

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Understand the Innovations in Food Engineering with reference to new techniques and Products. Cognitive level: Understand**CO2:** Apply knowledge of engineering principles applied in processing technology. Cognitive level: Understand, apply and Analyze**CO3:** Understanding of basic and applied engineering principles used for thermal and Non-thermal Food Engineering Operations. Cognitive level: Understand

CO4: Analyse the Food Processing Technologies and Impact on Product Attributes. Cognitive level: Understand and Analyze

CO5: Recognise the Fluid flow and design of equipments. Cognitive level: Understand

CO6: Understand the Principles of mass transfer, mass balance calculations, Laws of thermodynamics, heat transfer, Nature of heat flow. Cognitive level: Understand and Analyze

CO7: Understand the Refrigeration cycles, performance of refrigeration compressors, refrigeration system balance and multiple evaporation systems. Cognitive level: Understand

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1	1	2	2	1	1	1	1	2	3	2	1	3
CO2	2	2	2	3	1	1	1	1	2	2	3	2	2	3
CO3	3	3	2	3	2	1	1	2	2	3	3	3	2	3
CO4	2	3	2	3	2	2	1	2	2	3	3	3	2	3
CO5	3	1	1	2	2	1	1	1	1	2	3	2	1	3
CO6	3	3	2	3	2	1	1	2	2	3	3	3	3	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs).
Write ‘3’ in the box for ‘High-level’ mapping, ‘2’ for ‘Medium-level’ mapping, ‘1’ for ‘low-level’ mapping

Detailed Syllabus (Theory)

UNIT-I

Introduction to food engineering, Principles of mass transfer, mass balance calculations, Fluid flow, Reynolds Number, friction losses in pipes, measurement of fluid flow.

UNIT-II

Laws of thermodynamics, heat transfer Nature of heat flow, modes of heat transfer, steady state heat conduction equation, Heat conduction in slabs, cylinders & spheres heat generation inside solids, unsteady state heat conduction. Moisture content (wet and dry basis) theory and calculations.

UNIT III

Design of single & multi effect evaporators, thin layer and thick layer bed drying. Natural convection and its applications. Maintenance of equipments, Plant Layout and diagram codes.

Refrigeration cycles, performance of refrigeration compressors, refrigeration system balance and multiple evaporation systems.

References:

1. Heldman DR & Singh RP. Food Process Engineering. AVI Publ
2. R.C. Sachdeva. Fundamentals of Engineering Heat and mass transfer.
3. Fellows P. Food Processing Technology. VCH Ellis Horwood.
4. Brennan JG, Butter JR, Corell ND & Lilly AVE. Food Engineering Operations. Elsevier.
5. Charm SE, McCabe WL, Smith JC & Harriott P. Unit Operations of Chem Engineering. McGraw Hills.
6. Sahay KM & Singh KK. Unit Operation of Agricultural Processing. Vikas Publ. House.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam (30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

CORE PAPER **SEMESTER I**

Paper Title: Lab -I

Paper Code: MFTC- 106

Total Credits-08, Total Hours-100, Maximum Marks: 150 (Internal Assessment-50, Final Exam-100)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Acquire skills to analyse effect of processing on various nutrients.

CO2: Competence to use various equipments for food processing.

CO3: Perform qualitative analysis of protein and minerals.

CO4: Analyze quantitatively and assess cooking losses.

CO5: Demonstrate skills on determination of edible portion, effect of cooking on volume and weight.

CO6: Choose appropriate cooking method to conserve nutrients.

CO7: Acquire skills on different methods of cooking.

CO8: Develop new innovative products by applying knowledge on properties of food.

CO9: Acquire skill on various methods of assessing nutritional status.

CO10: Relate metabolism of macronutrients with health.

CO11: Comprehend the functions of micronutrients with health

CO12: Associate knowledge of nutrients with their deficiencies

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2	3	3	3	3	2	3	3	3
CO2	2	3	2	3	2	3	1	2	2	3	3	3	2	2
CO3	2	3	3	2	2	3	2	1	3	3	3	1	2	2
CO4	3	3	3	3	3	3	3	3	2	3	3	3	3	3
CO5	3	2	3	3	3	2	2	2	3	3	3	2	3	3
CO6	3	3	3	3	3	2	2	2	3	2	1	2	3	3
CO7	3	3	2	3	3	3	3	3	1	3	1	3	3	3
CO8	3	3	3	3	3	3	1	2	3	3	3	3	2	2
CO9	2	2	3	2	2	3	3	1	1	3	2	3	3	2
CO10	2	3	3	3	2	3	2	3	3	3	2	1	2	2
CO11	3	3	2	2	2	3	2	2	2	1	3	2	3	3
CO12	3	3	2	3	3	2	1	2	2	3	3	1	3	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write ‘3’ in the box for ‘High-level’ mapping, ‘2’ for ‘Medium-level’ mapping, ‘1’ for ‘low-level’ mapping

Detailed Syllabus (Theory)

1. Determination of moisture content in meat samples.
2. Determination of fat content in meat samples
3. Determination of protein content.
4. Determination of crude fibre content.
5. Study of Animal Carcass and Meat grading and cutting practices.
6. Study of Smoking on different physico-chemical and sensory characteristics on Meat and meat products.
7. To carry out candling and grading of shell eggs.
8. Visit to a meat processing plant.
9. Preparation of different meat products.
10. Design of Cold storage.
11. Design of Grain storage and Silo.
12. Performance evaluation of different mills.
13. Material balance in food processes.
14. Comparison of tray dryer and vacuum tray drying of food and vegetable.
15. Freeze drying characteristic of food material
16. Particle size analysis of different flours.
17. Determination of viscosity of different foods.
18. To study the engineering properties of different food materials.
19. To calculate the angle of repose of different grains.
20. To calculate the heat penetration in foods.
21. To evaluate texture of raw and processed foods using texture analyser.
22. To analyse the flour quality by Falling Number.
23. To study the glass transition of foods.
24. To study the structure of grains.
25. Determination of TSS of different foods
26. Sensory evaluation: To perform recognition test for four basic tastes and determine sensitivity/threshold tests for four basic tastes.
27. To carry out microbiological assessment of indoor air quality
28. Preparation and quality evaluation of fruit jam / jelly, fruit marmalade; fruit preserve and candy; fruit RTS, squash, syrup;
29. Processing of tomato products;
30. Preparation of pickle/mixed pickle;
31. Physical-tests on wheat and rice;
32. Determination of gluten content in wheat flour;
33. Milling of wheat and rice by laboratory mill;
34. Assessment of degree of polishing;
35. Quality tests of rice; Amylose content determination in rice;
36. Malting of Barley,
37. Extraction of oil using expeller and solvent extraction methods.
38. Study of milling characteristics of Food by Ball mill.
39. Study of milling characteristics of Food by Hammer mill
40. Estimation of tannin content in different fruit products.
41. Determination of ascorbic acid content in the food samples.
42. Study on Zero Energy Cooling Chamber for Shelf-life study of Fruits and Vegetable

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (50 marks) and End semester examination (100 marks). Internal assessment consists of continuous mode (20 marks) and sessional examinations (30 marks). Continuous mode evaluation is of 20 marks comprising of Attendance -10 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2.5 mark; 81-85: 5 marks; 86-90: 7.5 marks and >90: 10marks), Practical report contain 10 marks.

Total Marks are 150 for the subject (Internal Assessment: 50 marks and End Semester Examination: 100 Marks)

DISCIPLINE SPECIFIC ELECTIVE I **SEMESTER I**

Paper Title: Engineering Properties of Foods

Paper Code: MFTD-107

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Recognise the Physico-chemical characteristics of foods. Cognitive level: Understand and Analyze

CO2: Determine the electrical resistance and conductance, dielectric constant, energy absorption by different food components and Numerical calculations of the same. Cognitive level: Understand and Analyze

CO3: Understand the different Physical states of Matter, Rheology of food materials. Cognitive level: Understand and Analyze

CO4: Know the application of engineering properties in process development as well as design and operation of equipment and structures associated with handling, processing and storage of raw as well as processed food products. Cognitive level: Apply

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1	2	3	1	2	1	3	2	1	3	3	3	3
CO2	3	3	3	3	1	1	2	2	2	1	3	3	3	3
CO3	2	2	3	3	1	2	1	2	2	1	3	3	3	3
CO4	3	3	3	3	1	2	2	2	2	2	3	3	3	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

UNIT-I

Physico-chemical characteristics: shape, sphericity, size, volume, density, porosity, surface area, terminal velocity, drag coefficient, coefficients of friction and angle of repose, Reynolds number.

UNIT-II

Specific heat, thermal conductivity, thermal diffusivity, electrical resistance and conductance, dielectric constant, energy absorption, Numerical calculations.

UNIT-III

Physical states of Matter, Rheology of food materials, Newtonian and Non-Newtonian fluids, rheological models and equations, Linear Visco-elasticity, Creep stress relaxation, Plastic behaviour. Texture profile analysis.

UNIT-IV

Application of engineering properties in process development as well as design and operation of equipment and structures associated with handling, processing and storage of raw as well as processed food products.

Recommended Books:

1. M.A. Rao & S.S. H. Rizvi. Engineering Properties of Foods. CRC Press.
2. J. M. Aguilera & D. W. Stanley. Micro-structural principles of food processing and Engineering.
3. N. N. Mohsenin. Physical properties of plant and animal materials.
4. Zeki Berk. Food Process Engineering and Technology. Academic Press.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam

(30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

DISCIPLINE SPECIFIC ELECTIVE II **SEMESTER I**

Paper Title: Unit Operations in Food Processing

Paper Code: MFTD-108

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Learn the material handling and conveyance of food grain and powder in different food industries. Cognitive level: Understand

CO2: Analyse the methods of Cleaning, Size Reduction and principles of laws of size reduction, energy calculations, equipment selection. Cognitive level: Understand and Analyze

CO3: Utilize the technology of mixing and different terminologies used. Cognitive level: Understand

CO4: Analyse the different designing equipments. Cognitive level: Understand and Analyze

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1	1	2	2	1	1	1	1	2	3	2	1	3
CO2	2	2	2	3	1	1	1	1	2	2	3	2	2	3
CO3	3	3	2	3	2	1	1	2	2	3	3	3	2	3
CO4	2	3	2	3	2	2	1	2	2	3	3	3	2	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

UNIT-I

Material handling - Theory, classification of various material handling equipment - conveyors, elevators, trucks, cranes and hoists, Conveyance of food grain and powder in screw and vibratory conveyors. Selection of material handling equipments.

UNIT-II

Cleaning - Types, aims of cleaning, methods of cleaning, Dry cleaning methods: screening, aspiration, magnetic cleaning and abrasive cleaning. Wet cleaning methods: soaking, spray washing, flotation washing and ultrasonic washing. Sorting and Grading - Advantages of sorting and grading, grading factors, methods of sorting and grading.

UNIT III

Size Reduction: principles and laws of size reduction, energy calculations, equipment selection, Particle size analysis.

UNIT IV

Mixing - Terminology (agitating, kneading, blending, and homogenizing), equipments - mixers for liquids of low or moderate viscosity (Paddle agitators, turbine agitators and propeller agitators), mixers for high viscosity pastes (Pan mixer, horizontal mixer and dough mixer), mixers for dry solids (tumbler mixer and vertical screw mixer), effect of mixing on foods. Power consumption and efficiencies.

UNIT V

Theory and equipment for filtration, Expression, Concentration and Evaporation, Distillation, Sedimentation fluidization and centrifugation**.**

Recommended Books:

1. Geankoplis J Christie. (1999). Transport Process and Unit Operations. Allyn & Bacon.
2. Earle R. L. and Earle M.D.. Unit Operations in Food Processing
3. McCabe WL & Smith JC. (1999). Unit Operations of Chemical Engineering. McGraw Hill.
4. Sahay KM & Singh KK. (1994). Unit Operation of Agricultural Processing. Vikas Publ. House.
5. Singh RP and Heldman DR. (1993).Introduction to Food Engineering. Academic Press

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam (30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

GENERIC SPECIFIC ELECTIVE I **SEMESTER I**

Paper Title: Plantation Crops and Spices

Paper Code: MFTG-109

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Relate the Occurrence, chemistry of chemical constituents of Coffee.

CO2: Determine the fermentation of coffee beans and FSSA standards for coffee.

CO3: Understand the manufacturing of major and minor Spice processing.

CO4: Define the Classification, Processing and composition of major and minor Indian spices.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1	2	1	3	1	1	1	3	1	1	1	1	2
CO2	2	1	2	1	3	3	1	2	3	3	3	2	1	3
CO3	2	3	2	1	3	2	1	2	3	3	3	2	3	3
CO4	1	1	2	1	3	1	1	1	2	2	2	1	1	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

UNIT I

Coffee: Occurrence, chemistry of chemical constituents; harvesting, dry and wet coffee processing ; flow sheet for conversion of coffee beans into beverage: fermentation of coffee beans; roasting , grinding, drying, extraction; decaffeinated coffee, instant coffee manufacturing; coffee-chicory mixture; quality grading; FSSA standards for coffee**.** Tea: Occurrence, harvesting, chemistry of constituents: black tea and green tea; manufacturing of green and black tea, oolong; other tea-oloong, pickled, decaffeinated; instant tea manufacture; quality evaluation and grading of tea.

Unit- II

Cocoa: Occurrence, chemistry of the cocoa bean; processing of coffee beans ,changes taking

place during fermentation of cocoa bean; manufacturing of cocoa powder, cocoa liquor, cocoa butter, chocolates; sugar bloom and fat bloom in chocolates; quality control of chocolates, FSSA standards for cocoa products.

Unit-III

Spice processing: Definition of spice and classification, Processing and composition of major Indian spices and herbs: Pepper, cinnamon, cardamom, chillies, Turmeric and Ginger;
Processing of dates, cashews, almond, raisins.

Unit-IV

Minor spices- ajowan, coriander, cumin, vanilla, asafoetida, cinnamon, fenugreek, garlic, mustard, mace and nutmeg, saffron, onion, tarmarind, mint, cloves, leafy spices, bay; extraction of oleoresins and essential oils, spice adulteration; fumigation and irradiation of spices, microbial contamination

References:

1. Banerjee B. Tea Production and Processing. Oxford Univ. Press.
2. Minifie BW. Chocolate, Cocoa and Confectionery Technology. 3rd Ed. Aspen Publ.
3. NIIR. . Handbook on Spices. National Institute of Industrial Research Board, Asia Pacific Business Press Inc.
4. Sivetz M & Foote HE. Coffee Processing Technology. AVI Publ.
5. Varnam AH & Sutherland JP. 1994. Beverages: Technology, Chemistry and Microbiology. Chapman & Hall.
6. Woodroof JG & Phillips GF.1974. Beverages: Carbonated and Non-Carbonated. AVI Publ.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam (30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

GENERIC SPECIFIC ELECTIVE II SEMESTER I

Paper Title: Fruits and Vegetable Processing

Paper Code: MFTG-110

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Identify the Importance and scope of post-harvest management of fruits and vegetables.

CO2: Relate the Controlled and modified atmosphere Storages for different fruit.

CO3: Utilize raw materials for Processing for different food items viz., pickles, chutneys, sauces, pulp, puree and concentrates, from different fruits.

CO4: Understand the principles of Dehydration of fruits and vegetables.

CO5: Understand the Intermediate moisture fruits and vegetables.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1	2	1	3	1	1	1	3	1	1	1	1	2
CO2	2	1	2	1	3	3	1	2	3	3	3	2	1	3
CO3	2	3	2	1	3	2	1	2	3	3	3	2	3	3
CO4	1	1	2	1	3	1	1	1	2	2	2	1	1	3
CO5	3	1	2	1	3	1	1	1	3	1	1	1	1	2

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

UNIT-I

Importance and scope of post-harvest management of fruits and vegetables. Maturity indices and standards for selected fruits and vegetables; Methods of maturity determinations; Quality requirements of raw material for processing; Post harvest losses

Unit- II

Controlled and modified atmosphere Storage, Hypobaric storage; Pre-cooling and cold storage; Prevention of post-harvest diseases and infestation, Fumigation; Minimal processing Hurdle technology. Non thermal processing.

Unit-III

Processing for pickles, chutneys, sauces, pulp, puree and concentrates, from different fruits, RTS fruit beverages; TSS calculations; individual quick freezing; Post-harvest physiological and biochemical changes in fruits and vegetables.

Unit-IV

Dehydration of fruits and vegetables, sun and solar drying, osmotic, tunnel drying, fluidized bed drying, freeze drying, spray drying. Production of fruit powders. Intermediate moisture fruits and vegetables. Canning, Blanching

References:

1. Lal G, Siddappa GS & Tandon GL. Preservation of Fruits and Vegetables. ICAR.
2. Salunkhe DK & Kadam SS.,Handbook of Vegetables Science & Technology: Production, Composition, Storage and Processing.Marcel Dekker.
3. Srivastava RP & Kumar S. Fruit and Vegetable Preservation - Principles and Practices. International Book Distributors
4. Verma LR & Joshi VK. 2000. Post Harvest Technology of Fruits and Vegetables. Indus Publ.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam (30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

SEMESTER I

Paper Title: Industrial Visit
Paper Code: MFTC- 111
Credit: 1, Maximum Marks: 50 (Attendance: 20, Report-30)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: The students will visit the different food processing industries, to acquaint them with different handling, processing and preservation techniques.

CO2: students will understand the different hazards and risks associated with the processing.

CO3: The students get to know about the skills for writing report, which shall include; the layout of the industry, different machineries and their uses, limitations in the processing line and suggestions.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1	2	2	2	2	2	2	2	2	3	2	2	2
CO2	2	2	3	2	2	2	2	2	2	3	2	2	2	3
CO3	2	3	3	2	3	3	2	2	3	2	3	3	2	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

The students will visit the different food processing industries, to acquaint them with different handling, processing and preservation techniques. Different hazards and risks associated with the processing will also be explained. The students have to make a report, which shall include; the layout of the industry, different machineries and their uses, limitations in the processing line and suggestions. The report will be evaluated by the internal faculty members.

Assessment methods and weightages in brief

Internal assessment (50marks) Internal assessment consists of continuous mode (20 marks) and report submission (30 marks).

CORE **PAPER**
SEMESTER II

Paper Title: Research Methodology
Paper Code: MFTC-201
Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Understand the meaning of research its objectives and types,

CO2: Recognise the criteria of good research, Significance of research, Research and scientific methods.

CO3: Identify Research ethics, research integrity, standards and problems in research ethics, research safety in laboratories, welfare of animals used in research.

CO4: Determine the ways of selecting of research problem, Justification, theory, hypothesis, basic assumptions, limitations and delimitations of the problem.

CO5: Learn the Regression, Significance Level, ANOVA, Co-Relations, Chi square test, T-Test, F-Test, RSM. Introduction to different statistical software's.

CO6: Understand the know-how of funding Agencies: DST, DBT, MoFPI, CSIR, ICMR, SERB, UGC.

CO7: Understand report writing, Research proposal, Bibliography, Impact factor.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	3	1	1	3	2	2	3	2	1	3	3	3	3
CO2	2	3	2	1	2	2	1	3	3	1	3	3	3	3
CO3	1	2	1	1	2	2	2	3	3	1	3	3	3	3
CO4	3	3	2	2	2	2	2	3	2	1	3	3	3	3
CO5	3	3	3	3	2	2	2	3	2	1	3	3	3	3
CO6	1	3	1	1	2	2	2	3	2	1	3	3	3	3
CO7	1	1	1	1	2	2	2	3	2	1	3	3	3	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

UNIT-I

Research – Meaning, Objectives and types, criteria of good research, Significance of research, Research and scientific methods. Research ethics, research integrity, standards and problems in research ethics, research safety in laboratories, welfare of animals used in research. Selection of research problem, Justification, theory, hypothesis, basic assumptions, limitations and delimitations of the problem.

UNIT-II

Sampling techniques, Population and sample, collection and classification of data, Frequency distribution, Diagrammatic Representation of data, Measures of central tendencies–Mean, Median and Mode, Measures of dispersion – Range, Quartile deviation, standard deviation, Skewness and Kurtosis.

UNIT-III

Introduction to Regression, Significance Level, ANOVA, Co-Relations, Chi square test, T-Test, F-Test, RSM. Introduction to different statistical software's.

UNIT-IV

Introduction to Funding Agencies: DST, DBT, MoFPI, CSIR, ICMR, SERB, UGC.

UNIT-V

Report writing, Research proposal, Bibliography, Impact factor.

Recommended Books:

1. Kothari, C.K., Research Methodology- Methods and Techniques, (New Age International, New Delhi).
2. Trochim, William M.K., Research Methods, (Biztantra, Dreamtech Press, New Delhi).
3. Gupta, C.B., An Introduction to Statistical Methods, 23rd Edition, Vikash Publications.
4. Gupta, SC & Kapoor, VK. Fundamentals of mathematical Statistics: A modern approach, (2000), Sultan Chand & Sons.
5. Aggarwal, BL. 2003. Basic Statistics. New Age Publishers, New Delhi.

Teaching-Learning Strategies in brief

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Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam (30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

CORE PAPER **SEMESTER II**

Paper Title: Bakery and Confectionery Technology

Paper Code: MFTC-202

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Recognise the status of bakery industry in India. Raw materials and quality parameters used to be kept for production of bakery products.

CO2: Understand the technology for the manufacture of innovative bakery products.

CO3: Analyse the characteristics, faults and corrective measures of various bakery products.

CO4: Analyse the quality characteristics of confectionery ingredients; technology for manufacture of confectioner.

CO5: Understand the general technical aspects of Industrial sugar confectionery.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1	1	2	2	1	1	1	1	2	3	2	1	3
CO2	2	2	2	3	1	1	1	1	2	2	3	2	2	3
CO3	3	3	2	3	2	1	1	2	2	3	3	3	2	3
CO4	2	3	2	3	2	2	1	2	2	3	3	3	2	3
CO5	3	1	1	2	2	1	1	1	1	2	3	2	1	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

UNIT-I

Bakery industry status in India. Raw materials and quality parameters; Functions of Gluten, rheological testing of dough-Farinograph, Mixograph, Extensograph, Rapid Visco Analyzer, Falling number.

UNIT-II

Technology for the manufacture of bakery products-bread, biscuits, crackers, cakes and the effect of variations in formulation on the quality of the finished product, characteristics, faults and corrective measures; types of icing; tools and equipments for Bakery products.

UNIT III

Quality characteristics of confectionery ingredients; technology for manufacture of chocolate and hard boiled candy; colour, flavour and texture of confectionary.

UNIT IV

General technical aspects of Industrial sugar confectionery; Boiled sweets, Caramel, toffee and fudge – Processing, Processing of liquorice paste, cream paste, marshmallow and fondents.

References:

1. Matz, (1989). Bakery Engineering and Technology, Vol I and II, CBS Publishers, New Delhi.
2. Dubey SC. Basic Baking. The Society of Indian Bakers, New Delhi.
3. Manley D. 2000. Technology of Biscuits, Crackers & Cookies. 2nd Ed. CRC Press.
4. Pomeranz Y. Modern Cereal Science and Technology. MVCH Publication

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam (30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

CORE PAPER **SEMESTER II**

Paper Title: Food Safety and Quality Management

Paper Code: MFTC-203

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Understand the different quality attributes of food (Cognitive level: Understand)

CO2: Analyse the different quality attributes of food (Cognitive level: Analyse)

CO3: Understand the principles of food toxicology and methods used in safety evaluation-risk assessments of food toxins (Cognitive level: Understand)

CO4: Application of risk assessment to food safety (Cognitive level: Apply)

CO5 : Understand the national and international food Safety standards and regulations ((Cognitive level: Understand)

CO6: Evaluate the quality management systems to determine suitability in given context

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	3	1	2	1	1	1	1	1	1	3	1	3
CO2	3	3	3	1	2	1	1	1	3	2	1	3	3	3
CO3	2	3	3	2	2	2	1	1	1	2	1	3	2	3
CO4	3	3	2	3	2	2	1	3	3	2	1	3	1	3
CO5	3	3	1	1	2	3	3	3	1	2	1	3	1	3
CO6	3	3	3	3	2	3	3	3	3	3	1	3	3	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

UNIT –I

Quality attributes of food, Gustation: Mechanism of taste perception, Difference tests for sensory evaluation; Olfaction, Colour: CIE (International Commission on Illumination) color system; Image processing techniques for Food Quality Evaluation; Texture.

UNIT –II

Food Toxicology: Definition, scope and general principles, Food toxicants: factors affecting toxicity of compounds, Methods used in safety evaluation-risk assessments, Natural toxic constituents in plant foods, Shellfish poisoning, Existing and emerging pathogens due to globalisation of food trade, Testing of food ingredients & additives, Animal studies including LD50, Ames test.

UNIT – III

Food Safety standards and regulation: Introduction; Food Safety Standards Authority of India; BIS, Ministry of Consumer Affairs, Codex Alimentarius, United States Food and Drug Administration, European Union norms, FSANZ.

UNIT – IV

Quality management systems, Good manufacturing practices; Good hygienic practices; ISO 22000; Good Agricultural Practices, Good Laboratory practices, Hazard analysis critical control points (HACCP); Safe quality food, Halal certification, Halal requirements.

Suggested reading:

1. Amerine MA, Pangborn RM &Rosslos EB. Principles of Sensory Evaluation of Food. Academic Press.

2. Early R.Guide to Quality Management Systems for Food Industries. Blackie Academic.
3. Furia TE. Regulatory status of Direct Food Additives. CRC Press.
4. Jellinek G. Sensory Evaluation of Food - Theory and Practice. Ellis Horwoood.
5. Krammer A &Twigg BA. Quality Control in Food Industry. Vol. I, II. AVI Publ.
6. Macrae R, Roloson R &Sadlu MJ. Encyclopedia of Food Science & Technology & Nutrition. Vol. XVI. Academic Press.
7. Piggot J.R. Sensory Evaluation of Foods. Elbview Applied Science.
8. Ranganna S. Handbook of Analysis and Quality Control for Fruit and Vegetable Products. 2nd Ed. Tata-McGraw-Hill.

CORE PAPER **SEMESTER II**

Paper Title: Dairy Technology and Engineering

Paper Code: MFTC-204

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Understand the Status of dairy in India and world, and quality evaluation and testing of milk. (Cognitive level: Understand and analyse)

CO2: Gain insight on processing aspects of milk with new technologies and their applications (Cognitive level: Analyse and understand)

CO3: Understand the milk products chemistry and milk microbiology (Cognitive level: Understand).

CO4: Apply the principles of dairy processing to value added milk products development

CO5: Understand the principles of thermal death kinetics and quality changes during processing of milk (Cognitive level: Understand).

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	1	3	3	2	3	2	2	3	3	3	3
CO2	3	3	3	1	3	3	2	3	2	2	1	2	3	3
CO3	2	2	2	1	3	3	2	2	2	1	3	3	3	2
CO4	3	3	3	2	1	2	2	2	2	1	2	3	2	2
CO5	2	2	2	2	1	2	1	2	1	1	2	3	2	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write ‘3’ in the box for ‘High-level’ mapping, ‘2’ for ‘Medium-level’ mapping, ‘1’ for ‘low-level’ mapping

Detailed Syllabus (Theory)

Unit –I

Status of dairy in India and worldwide. Quality evaluation and testing of milk; Procurement, and processing of market milk; flavoured, sterilized, recombined, full fat, reconstituted toned and double toned milk. Probiotic milk.

Unit- II

Milk products chemistry and microbiology processing: Condensed milk, Dried milk, Milk Cream, Butter, Ghee, Cheese, Ice cream, yoghurt, dahi, khoa, burfi, kalakand, gulabjamun, rosogolla, srikhand, chhana, paneer, lassi.

Unit-III

Principle of homogenization, single and double stage homogenizers, application of homogenization in dairy industry, design principles of homogenizers, types of tanks, pumps in dairy industry, Agitation and mixing, construction of agitators.

Unit-IV

Pasteurization of milk; batch, flash and continuous pasteurizer, HTST pasteurizer and design principle and thermal death kinetics, quality changes during processing of milk, Evaporator, types of evaporator, heat and mass balance in single and multiple effect evaporator, steam economy, estimation of drying rates and drying time, drying equipments, design of spray and drum dryer.

References:

1. Aneja RP, Mathur BN, Chandan RC & Banerjee AK. Technology of Indian Milk Products. Dairy India Publ.
2. De S. Outlines of Dairy Technology. Oxford Univ. Press.
3. Henderson JL. Fluid Milk Industry. AVI Publ.
4. Rathore NS et al. Fundamentals of Dairy Technology - Theory & Practices. Himanshu Publ
5. Spreer E. Milk and Dairy Products. Marcel Dekker.
6. Walstra P. Dairy Technology. Marcel Dekker.
7. Walstra P. (Ed.). Dairy Science and Technology. 2nd Ed. Taylor & Francis.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam

(30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

CORE PAPER **SEMESTER II**

Paper Title: Functional Foods and Nutraceuticals

Paper Code: MFTC-205

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Understand the development of functional foods, its history, concepts, sources and classification.

CO2: Understand pleiotropic Effects of Bioactive Phytochemicals.

CO3: Get to know about the nutraceuticals for infants, adolescent/ pregnant ladies and nursing mothers, geriatrics.

CO4: Understand the foods recommended and restricted in metabolic disorders.

CO5: Understand the nutritional deficiencies and its correction through fortification and supplementation of foods.

CO6: Understand the beneficial effect of spices, honey, spirulina etc.

CO7: Understand the health benefits of PUFA/ gamma linolenic acids, antioxidants (polyphenols), dietary fiber, oligosaccharides, sugar alcohols, peptides and proteins, glycosides, alcohols, iso-prenoides and vitamins, choline.

CO8: Understand the transgenic plant foods with health claims, the use and development of prebiotics and Probiotics,

CO9: Get to know about the regulatory issues for nutraceuticals, Clinical testing of nutraceuticals.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	1	1	1	1	1	3	3	1	3
CO2	3	3	3	2	1	3	2	2	1	2	3	2	3	2
CO3	3	3	3	2	1	2	3	2	2	1	3	2	3	3
CO4	3	3	3	2	2	2	3	2	2	1	3	2	3	3
CO5	3	3	3	1	1	2	3	2	2	1	3	2	3	3
CO6	3	3	3	1	1	2	3	2	2	1	3	2	3	3
CO7	3	3	3	1	2	2	3	2	2	1	3	2	3	3
CO8	3	3	3	1	1	2	3	2	2	1	3	2	3	3
CO9	3	3	2	2	1	2	3	2	2	1	3	2	3	2

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

UNIT I

Functional food: History and concepts, sources and classification; Pleiotropic Effects of Bioactive Phytochemicals. Nutraceuticals for infants, adolescent/ pregnant ladies and nursing mothers, geriatrics.

UNIT II

Food recommended and restricted in metabolic disorders : diabetes, obesity; gastrointestinal disorders; liver, and pancreatic disturbances; cardiovascular diseases; urinary and musculoskeletal diseases; allergies. Nutritional deficiencies and its correction through fortification and supplementation of foods.

UNIT III

Beneficial effect of spices, honey, spirulina etc. Health benefits of PUFA/ gamma linolenic acids, antioxidants (polyphenols), dietary fiber, oligosaccharides, sugar alcohols, peptides and proteins, glycosides, alcohols, iso-prenoides and vitamins, choline,

UNIT IV

Transgenic plant foods with health claims. Prebiotics and Probiotics, regulatory issues for nutraceuticals, Clinical testing of nutraceuticals

BOOKS RECOMMENDED:

1. Human nutrition: A textbook of nutrition in health and disease. B. T. Burton, Mc Graw Hill, 3rd Edition, 2002.
2. Nutrition and Dietetics. S. A. Joshi, Tata Mc Graw Hill Co. Ltd., 2nd Edition, 2003.
3. Dietetics. B. Shrilakshmi, New Age International (P) Ltd., New Delhi, 5th Edition, 2005.
4. Nutrition and Dietetic Foods, A. E. Bender, Chem. Pub. Co. New York, 2nd Edition, 2004.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam (30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

Paper Title: LAB II
Paper Code: MFTC-206

Total Credits-08, Total Hours-100, Maximum Marks: 150 (Internal Assessment-50, Final Exam-100)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: To develop different bakery products.

CO2: To assess personal hygiene of food handlers

CO3: To develop various concentrated products by using Open Pan Evaporator and shelf-life study.

CO4: Detection of preservatives and additives.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2	3	3	3	3	2	3	3	3
CO2	2	3	2	3	2	3	1	2	2	3	3	3	2	2
CO3	2	3	3	2	2	3	2	1	3	3	3	1	2	2
CO4	3	3	3	3	3	3	3	3	2	3	3	3	3	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

List of Experiments:

1. Preparation of different bakery products.
2. Visit to a bakery plant.
3. Preparation of sensory score cards based on hedonic scale, paired comp. test, duo trio test.
4. To assess personal hygiene of food handlers.
5. To prepare a HACCP plan for a food processing unit.
6. Preparation of dried ginger; preparation of dried onion and garlic;

7. Preparation of banana and potato wafers; preparation of dehydrated vegetables.
8. Preparation of concentrated products by using Open Pan Evaporator and shelf life study.
9. Determination of titrable acidity, pH and clot on boiling test in milk.
10. Detection of added starch and cane sugar in milk
11. Detection of preservatives: formalin, H_2O_2 in milk.
12. Detection of presence of neutralizers in milk.
13. Preparation of chana and paneer from milk.
14. Preparation of flavored milk.
15. Preparation of Ice cream.
16. Estimation of salt in butter sample.
17. Demonstration of AAS, GCMS, HPLC, NMR, FTIR, DSC, TGA
18. Design and layout of Dairy plant.
19. Demonstration to design of fermenter.
20. Preparation of whey-based beverages
21. Preparation of iced and flavoured tea beverage
22. Preparation of carbonated and noncarbonated soft drinks
23. To study the drying characteristics of different food materials.
24. To plot drying curve for onion, potato, tomato slices.
25. Moisture Sorption Isotherm of different foods.
26. Calculation of moisture content on dry weight basis and wet weight basis.
27. Model fitting to drying curves.
28. To check the viscosity of different food materials.
29. To prepare a HACCP plan for a dairy processing unit.
30. Identification of different types of packaging and packaging materials
31. Determination of tensile strength of given material
32. Destructive and non-destructive test on glass container, drop test
33. Determination of wax weights, tensile strength of papers, bursting strength
34. WVTR of packaging materials
35. Measurement of thickness of packaging materials
36. Testing of chemical resistance of packaging materials
37. Determination of shelf life of packaged foods; determination of ERH of foods.
38. Introduction of students with the latest trends in packaging from websites and magazines.
39. Shelf life and sensory study of Vacuum packed food products.
40. Shelf life and sensory study of Shrinked packed food products.
41. To determine adulteration in spices.
42. To determine the adulteration in milk samples.
43. Layout of different food processing industries.
44. Design and Layout of Food Testing Labs.
45. Visit to Silo, FCI Godowns.
46. Visit to ISO 22000 certified Industries.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (50 marks) and End semester examination (100 marks). Internal assessment consists of continuous mode (20 marks) and sessional examinations (30 marks). Continuous mode evaluation is of 20 marks comprising of Attendance -10 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2.5 mark; 81-85: 5 marks; 86-90: 7.5 marks and >90: 10marks), Practical report contain 10 marks.

Total Marks are 150 for the subject (Internal Assessment: 50 marks and End Semester Examination: 100 Marks)

DISCIPLINE SPECIFIC ELECTIVE COURSE–I **SEMESTER II**

Paper Title: Food Rheology and Microstructure

Paper Code: MFTD-207

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Understand the rheology of foods, texture and microstructure. *Cognitive level: Understand*

CO2: Know about the history of Food Microstructure, Light Microscopy, Transmission Electron Microscopy, Scanning Electron Microscopy. *Cognitive level: Understand*

CO3: Understand the rheological classification of Fluid Foods. *Cognitive level: Understand*

CO4: Understand the pasting properties and Linear Viscoelastic Range, Creep recovery. *Cognitive level: Understand and Analyze*

CO5: Understand the effect of processing and additives (stabilizers and emulsifiers) on food product rheology. *Cognitive level: Understand and Analyze*

CO6: Understand the relationship between instrumental and sensory data. *Cognitive level: Understand and Analyze*

CO7: Understand the effects of processing on rheology and texture. *Cognitive level: Understand and Analyze*

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	1	1	2	1	2	3	3	3	3
CO2	2	2	3	3	2	2	1	1	1	2	3	3	3	3
CO3	3	2	2	3	2	1	1	2	1	2	3	3	3	3
CO4	2	2	3	3	2	2	1	1	1	2	3	3	3	3
CO5	3	2	2	3	2	1	1	2	1	2	3	3	3	3
CO6	2	2	3	3	2	2	1	1	1	2	3	3	3	3
CO7	3	2	2	3	2	1	1	2	1	2	3	3	3	3

22332211123333Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

UNIT-I

Introduction to rheology of foods, texture and microstructure. History of Food Microstructure, Light Microscopy, Transmission Electron Microscopy, Scanning Electron Microscopy.

UNIT-II

Rheological classification of Fluid Foods: Newtonian and Non-Newtonian fluids; Mechanisms and relevant models for non-Newtonian flow; Effect of temperature; Compositional factors affecting flow behaviour. Pasting properties and Linear Viscoelastic Range, Creep recovery.

UNIT III

Rheological and textural properties of selected food products. Texture profile analysis, Effect of processing and additives (stabilizers and emulsifiers) on food product rheology; Relationship between instrumental and sensory data.

UNIT IV

Comparative assessment of different types of Viscometers, and their Merits and Limitations: Coaxial cylinders, Spindle- or Impeller-type viscometers, Cone-plate viscometer, Capillary viscometers, Falling- sphere viscometer, Vibratory viscometers, Extrusion viscometer, Orifice viscometer.

UNIT V

Modifying microstructure, glass transition (starch, proteins and fats), effects of processing on rheology and texture.

References:

1. Bourne, M. Food Viscosity and Texture, 2nd Edition, Academic Press, New York, 2002.
2. José Miguel Aguilera. Microstructural Principles of Food Processing Engineering.
3. Macosko, Ch.W. Rheology: Principles, Measurements, and Applications (Advances in Interfacial Engineering), Wiley-VCH, 1994.

4. Morrison, Faith. Understanding Rheology, Oxford University Press, 2001.
5. Donald B. Bechtel. New Frontiers in Food Microstructure.
6. Moskowitz. Food Texture.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam (30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

DISCIPLINE SPECIFIC ELECTIVE COURSE–I **SEMESTER II**

Paper Title: Advances in Drying Technology

Paper Code: MFTD-208

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Understand the theory of drying, bound moisture, free moisture, equilibrium moisture content, critical moisture content, drying rate curves.

CO2: Understand the engineering aspects of different types of drier.

CO3: Understand the Psychometry, Moisture sorption curves, Drying rate periods and their calculation, Heat and mass transfer coefficient calculations, Capillary and diffusion theory.

CO4: Understand the calculations for water activity, moisture content; wet basis and dry basis.

CO5: Understand the physical, chemical and microbiological characteristics of dehydrated foods, Rehydration ratio, size and density, shelf-life, Microbial stability of dried foods.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	1	1	2	1	2	3	3	3	3
CO2	2	2	3	3	2	2	1	1	1	2	3	3	3	3
CO3	3	2	2	3	2	1	1	2	1	2	3	3	3	3
CO4	2	2	3	3	2	2	1	1	1	2	3	3	3	3
CO5	3	2	2	3	2	1	1	2	1	2	3	3	3	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

Unit –I

Drying-Theory of drying, bound moisture, free moisture, equilibrium moisture content, critical moisture content, drying rate curves, engineering aspects of different types of driers including bin drier, tray drier, drum drier, tunnel drier, spray drier, fluidized bed drier, freeze drier. Principle of humidification & dehumidification, humidity chart, wet and dry bulb temperature.

Unit- II

Psychometry, Moisture sorption curves, Drying rate periods – constant and falling rate periods and their calculation, Heat and mass transfer coefficient calculations, Capillary and diffusion theory, Thin layer and deep bed drying, Dryer performance indices – overall thermal efficiency, specific energy consumption, coefficient of performance.

Unit-III

Water activity, moisture content; wet basis and dry basis; calculations, Physical, chemical and microbiological characteristics of dehydrated foods, Rehydration ratio, size and density, shelf-life, Microbial stability of dried foods.

References:

1. Singh RP. 1991. Fundamentals of Food Process Engineering. AVI Publ.
2. Singh RP and Heldman DR. 1993.Introduction to Food Engineering. Academic Press.
3. Fellows P. 1988.Food Processing Technology: Principle and Practice. VCH Publ.
4. Geankoplis J Christie. 1999. Transport Process and Unit Operations. Allyn & Bacon.
5. Henderson S & Perry SM. 1976.Agricultural Process Engineering.5th Ed. AVI Publ.
6. McCabe WL & Smith JC. 1999. Unit Operations of Chemical Engineering. McGraw Hill.
7. Sahay KM & Singh KK. 1994. Unit Operation of Agricultural Processing. Vikas Publ. House.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam (30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

GENERIC SPECIFIC ELECTIVE COURSE–I **SEMESTER II**

Paper Title: Advances in Food Packaging Technology

Paper Code: MFTG-209

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Understand the functions of packaging and packaging materials.

CO2: Understand the types of packaging materials, Biodegradable and recyclable packaging material.

CO3: Understand the active and intelligent packaging techniques, oxygen, ethylene and other scavengers.

CO4: Understand the Non-migratory bioactive polymers in food packaging along with Bioactive compounds, antimicrobial packaging system and its effectiveness.

CO5: Understand the modified atmosphere packaging (MAP), Controlled atmosphere packaging (CAP), combination of MAP and other preservative techniques.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	1	1	2	1	2	3	3	3	3
CO2	2	2	3	3	2	2	1	1	1	2	3	3	3	3
CO3	3	2	2	3	2	1	1	2	1	2	3	3	3	3
CO4	2	2	3	3	2	2	1	1	1	2	3	3	3	3
CO5	3	2	2	3	2	1	1	2	1	2	3	3	3	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

UNIT-I

Definitions, Functions of packaging and packaging materials; Types of packaging materials: Rigid, Semi- rigid and flexible: Paper and types of papers, Glass: composition, properties, types of closures, Metals: Tinplate containers, tinning process, components of tinplate, tin free steel (TFS), types of cans, aluminum containers, lacquers; Plastics: types of plastic films, laminated plastic materials, edible films, Biodegradable and recyclable packaging material.

UNIT-II

Active and intelligent packaging techniques, oxygen, ethylene and other scavengers: Oxygen scavenging technology, selection of right type of oxygen scavengers, ethylene scavenging technology, carbon dioxide and other scavengers, Time temperature indicators, freshness indicators, Pathogen indicators.

UNIT-III

Introduction to Non-migratory bioactive polymers in food packaging, Bioactive compounds in packaging, antimicrobial food packaging, antimicrobial packaging system, and effectiveness of antimicrobial packaging.

UNIT-IV

Modified atmosphere packaging (MAP), Controlled atmosphere packaging (CAP), combination of MAP and other preservative techniques. Aseptic packaging: Sterilization of packaging material.. Vacuum packaging in food products, seal and shrink packaging machine; form and fill sealing machines.

Recommended Books:

1. Ahvenainen, R. Novel Food Packaging Techniques. Woodhead Publishing Series.
2. Robertson, (2005), Principles of Food Packaging. CRC Press, USA
3. Scharow, S., and Griffin, R.C. (1980). Principles of Food Packaging, 2nd Edition, AVI Publications Co. Westport, Connecticut, USA.
4. Yam, KL, Lee, DS and Piergiovanni, L. Food Packaging Science and Technology. CRC Press.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam (30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

GENERIC SPECIFIC ELECTIVE COURSE–II **SEMESTER II**

Paper Title: Modern Techniques in Food Analysis

Paper Code: MFTG-210

Total Credits: 3, Total Lectures-50, Maximum Marks: 100 (Internal Assesment-25, Final Exam-75)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Understand the sampling techniques, Importance of sampling in food analysis, Food Safety and toxicity, calibration and standardisation of instruments, Accuracy and Precision.

CO2: Understand the Microscopic techniques in food analysis.

CO3: Understand the Biosensors, Artificial tongue, electronic nose etc

CO4: Understand the Basic principles of centrifugation, relation between g and RCF.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	1	1	2	1	2	3	3	3	3
CO2	2	2	3	3	2	2	1	1	1	2	3	3	3	3
CO3	3	2	2	3	2	1	1	2	1	2	3	3	3	3
CO4	2	2	3	3	2	2	1	1	1	2	3	3	3	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

Detailed Syllabus (Theory)

UNIT I
Sampling techniques, Importance of sampling in food analysis, Food Safety and toxicity, calibration and standardisation of instruments, Accuracy and Precision.

Unit- II
Chromatographic Techniques, Thin layer, Paper chromatography, column chromatography, normal phase and reverse phase chromatography, HPLC, GC, detectors (flame ionization, conductivity, FTIR, photoionization, MS, electron capture, MALDI).

Unit-III
Microscopic techniques in food analysis: Light microscopy, Compound microscopy, Scanning electron microscopy, Transmission electron microscopy.

Unit-IV
Biosensors, Artificial tongue, electronic nose, PCR, ELISA, NMR, Differential scanning calorimetry, Spectroscopic techniques.

Unit- V
Basic principles of centrifugation, relation between g and RCF, gel electrophoresis techniques,

References:

1. Skoog, D. A., Holler, F. J., & Crouch, S. R. (2017). Principles of instrumental analysis. Cengage learning.
2. Nielsen S. (Eds.). 1994. Introduction to Chemical Analysis of Foods. Jones & Bartlett
3. Ranganna S. 2001. Handbook of Analysis and Quality Control for Fruit and Vegetable Products. 2nd Ed. Tata-McGraw-Hill
4. AOAC International. 2003. Official methods of analysis of AOAC International. 17th Ed.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (25 marks) and End semester examination (75 marks). Internal assessment consists of continuous mode (10 marks) and sessional examinations (15 marks). Continuous mode evaluation is of 10 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- Less than 75: 0 marks; 75-80: 2 mark; 81-85: 3 marks; 86-90: 4 marks and >90: 5 marks),

Assignments contain 3 marks and Student teacher interaction-2 marks. There are two Sessional exams (each conducted for 30 marks and computed for 15 marks) and one improvement exam (30 marks and computed for 15 marks). The average marks of two best sessional exams are computed out of 15 marks.

Total Marks are 100 for the subject (Internal Assessment: 25 marks and End Semester Examination: 75 Marks)

Paper Title: Industrial Visit/Educational Tour Paper
Code: MFTC- 211
Credit 1, Maximum Marks: 50 (Attendance: 20, Report-30)

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: The students will learn to write review papers.

CO2: The students will learn deliver a presentation.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1	2	2	2	2	2	2	2	2	3	2	2	2
CO2	2	2	3	2	2	2	2	2	2	3	2	2	2	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

The students will visit the different food processing industries, to acquaint them with different handling, processing and preservation techniques. Different hazards and risks associated with the processing will also be explained. The students have to make a report, which shall include; the layout of the industry, different machineries and their uses, limitations in the processing line and suggestions. The report will be evaluated by the internal faculty members.

Assessment methods and weightages in brief

Internal assessment (50marks) Internal assessment consists of continuous mode (20 marks) and report submission (30 marks).

SECOND YEAR

COMPULSORY COURSE **SEMESTER III**

Paper Title: Industrial Training/Status Report

Paper Code: MFTC- 301

Total Credits 17 (T: 2 & P: 15) Max Marks: 350 (Internal 200, External 150)

The project shall comprise of the following two components *viz* Internal of 200 and External of 150 marks given as under.

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to

CO1: Learn how to take research problem

CO2: Understand the use of the experimental tools to carry the research experiments.

CO3: Understand the use of instruments and equipments to develop new products and other related work.

CO4: Understand how to write a project report or dissertation or thesis.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	3	2	3	3	3	3	3	3
CO2	3	3	3	3	3	2	3	2	3	3	3	3	3	3
CO3	3	3	3	3	3	2	3	2	3	3	3	3	3	3
CO4	3	3	3	3	3	2	3	2	3	3	3	3	3	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

INTERNAL: ***Industrial training***: Training will be minimum of 12 weeks duration carried out after 2nd semester. The students will submit their reports, and make a presentation in the 3rd Semester **OR** ***Status/Research Report***: The students will carry research on any topic relevant to Food Technology. The status paper should cover the Introduction, Review of Literature, Key findings, Conclusion and Inferences followed by References.

EXTERNAL: Each student will deliver a presentation on the topic of his/her project work carried out in department/industry/institute/research centre which will be evaluated by Departmental Research Committee (DRC) on the date and time fixed for the purpose**.** A viva voce examination will be conducted by an Expert (HOD nominee) on the date and time

fixed for the purpose.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (200 marks) and End semester presentation and viva (150 marks). Internal assessment consists of continuous mode (100 marks) and presentation (100 marks). Continuous mode evaluation is of 25 marks comprising of Attendance -5 marks (calculated as: Percentage of Attendance: Allotment of marks- 70-75: 15 marks; 75-80: 18 mark; 81-85: 20 marks; 86-90: 22 marks and >90: 25 marks), research work (75 marks)

FOURTH SEMESTER

Paper Title: PROJECT DISSERTATION

Paper Code: MFTC- 401

Total credits: 18 (T: 3 & P: 15) Max marks: 400

The project shall comprise of the following two components *viz* Internal of 250 and External of 150 marks given as under.

COURSE OUTCOMES (COs)

On the successful completion of the course, students will be able to:

CO1: Learn how to take research problem

CO2: Understand the use of the experimental tools to carry the research experiments.

CO3: Understand the use of instruments and equipments to develop new products and other related work.

CO4: Understand how to write a project report or dissertation or thesis.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	3	2	3	3	3	3	3	3
CO2	3	3	3	3	3	2	3	2	3	3	3	3	3	3
CO3	3	3	3	3	3	2	3	2	3	3	3	3	3	3
CO4	3	3	3	3	3	2	3	2	3	3	3	3	3	3

Each Course Outcome (CO) may be mapped with one or more program Outcomes (POs). Write '3' in the box for 'High-level' mapping, '2' for 'Medium-level' mapping, '1' for 'low-level' mapping

INTERNAL: Each student will undertake a project work in the fourth semester under the supervision of either a faculty from Jamia Hamdard or an expert from the industry/institute/research centre and under the overall supervision of Dean and Program Coordinator of the faculty. After the completion of project each student has to submit a project report by the deadline fixed for the same purpose.

EXTERNAL: Each student will deliver a presentation on the topic of his/her project work carried out in department/industry/institute/research centre which will be evaluated by an external examiner on the date and time fixed for the purpose**.** A viva voce examination will be conducted by an external examiner on the date and time fixed for the purpose.

Teaching-Learning Strategies in brief

The teaching learning strategies, followed are chalk-board teaching, learning through discussion among the peer group, classroom interaction, quiz, presentations, Q & A session and reflective learning.

Assessment methods and weightages in brief

There are two components of assessment: Internal assessment (250 marks) and End semester presentation and viva (150 marks). Internal assessment consists of continuous mode (100 marks) and presentation (150 marks). Continuous mode evaluation is of 25 marks comprising of Attendance -25 marks (calculated as: Percentage of Attendance: Allotment of marks- 70-75: 15 marks; 75-80: 18 mark; 81-85: 20 marks; 86-90: 22 marks and >90: 25 marks), research work (75 marks)