

**INSTITUTE OF CHEMICAL TECHNOLOGY**  
**Ordinances, Regulations and Syllabi relating to the**  
**Degree of Master of Perfumery and Flavour Technology**  
**(M.Tech-Perfumery and Flavour Technology)**

**1. Introduction**

The Institute is revamping its academic structure especially for the masters courses by way of introducing the compulsory industrial training for a period of six months (to be taken in the third semester of the program). The number of credits in the first two semesters has also been increased and a research component has been included. The total credits in the first two semesters now stand at 27 each instead of earlier 21. All the courses will continue to be credit based and the evaluation will be grade based.

The Departmental administrative committee and academic program committee periodically proposed the program outcomes having consistency with the graduate attributes available with NBA. The committee critically analysed information obtained from graduated students, employers and immediately passed out students. The program outcomes are as follows:

<b>SR. NO.</b>	<b>PROGRAM OUTCOMES (POS)</b>
1	The graduates will be able to apply knowledge of basic sciences of fragrance and flavours and engineering courses in getting solutions to issues pertaining to perfumery and flavour industries.
2	The graduates should be able to systematically break up complex problems in realizable steps and solve them.
3	The graduates will be able to design a system or a component of a system or provide a technical solution for a specific task within realistic constraints
4	The graduates will be able to design and conduct experiments as well as analyze and interpret data. The graduates should be able to systematically break up complex problems in realizable steps and solve them.
5	The graduate will be able to use modern tools, software, equipment etc. to analyze and obtain solution to the problems.
6	The graduates will be able to study the impact of Fragrance & Flavor industry on the global, economic, and societal context
7	The graduates should practice their profession considering environmental protection and sustainability
8	Graduates are expected to practice professional skills in an ethical manner
9	The graduates should have competence to undertake designated task on individual or team basis as per the requirement.
10	The graduates will be able to communicate effectively their points of view
11	The graduates will acquire attitude for life- long learning

12	The graduates should actively participate in project and financial management
----	---

SR. NO.	PROGRAM SPECIFIC OUTCOMES (PSOs)
13	Graduates will be acquainted with the latest development in different fields so as to enable them to take up higher studies, research & developmental work
14	Graduates will be introduced to managerial subjects, so as to enable them to take up further studies in management subjects & function effectively as managers

Credit system is a systematic way of describing an educational programme by attaching credits to its components. The definition of credits may be based on different parameters, such as student workload, learning outcomes and contact hours. It is a student-centric system based on the **student workload** required to achieve the objectives of a programme. It should facilitate academic recognition of the courses and mobility of the students. Credits assignment is based on the principle that Credits can only be obtained after successful completion of the work required and appropriate assessment of the learning outcomes achieved. As per the AICTE norms 2L/week of lectures are 2 credits, while 2h/week of practical/ /seminar/literature review/research work are 1 credit. This has been taken as the basis during the working of the proposed syllabus.

**Student workload** consists of the time required to complete all prescribed learning activities such as attendance at lectures/practical, seminars, projects, etc. Credits are allocated to all the educational components of a study programme and indicate the quantity of work each component requires to achieve its specific objectives.

Evaluation is an important component of any teaching-learning process. The Institute gives emphasis on continuous evaluation with considerable freedom to the teacher in deciding the mode of evaluation of the students. The performance of the student is documented by a **grade** at the end of the semester. The grading scale ranks the students on a statistical basis. Therefore, statistical data on student performance is a prerequisite for applying the grading system.

## 2. Course Credits

In general a certain quantum of work measured in terms of **credits** is laid down as the requirement for a particular degree. The student acquires credits by passing courses every semester, the amount of credit associated with a course being dependent upon the number of hours of instruction per week in that course.

There are mainly two types of courses in the Institute - lecture courses and laboratory courses. Lecture courses consist of lecture (L) and tutorial (T) hours. Laboratory courses consist of practical (P) hours. The credit (C) for a course is dependent on the number of hours of instruction per week in that course, as given below:

- (1) 1h/week of lecture (L) or tutorial (T) = 1 credit
- (2) 2h/week of Practicals (P) = 1 credit

(3) Credit (C) for a theory course = No. of hours of lectures per week + No. of hours of tutorials per week = L + T

(4) Credits (C) for a Laboratory course/Seminar/research work =  $\frac{1}{2}$  x No. of hours per week

Credits will be assigned to In-plant, Seminar, Projects and other mandatory course requirements also and these will be mentioned in the respective syllabi. There may be some non-credit requirements. A student is required to earn credits as mentioned in the syllabus.

### 3. Evaluation

#### 3.1 The weightage of different modes of assessments shall be as under.

	In-Semester evaluation		End-Semester-Exam	Components of continuous mode
	Continuous mode	Mid Semester-Exam		
Theory	20%	30%	50%	Quizzes, class tests (open or closed book), home assignments, group assignments, <i>viva-voce</i> assignments, discussions
Practical	50%	-	50%	Attendance, <i>viva -voce</i> , journal, assignments, project, experiments, tests
Seminar/ Research work			100%	Continuous evaluation not applicable, End semester evaluation will be based on written report evaluation and presentation in front of the external examiner within the Department

#### 3.2. In-Semester Evaluation:

- It is expected that the professor would conduct at least two assessments (in any form as quizzes, tests, home work, group work etc) under the continuous mode in a Semester.
- The professor will announce at the beginning of the respective course the method of conducting the tests under the continuous mode and the assignment of marks
- In-semester performance of all students should be displayed and sent to the academic office by the teacher at least 15 days before the end-semester examination.
- For the theory courses, there will be one mid-semester test for each course to be held as per the schedule fixed in the Academic Calendar.
- For mid –semester examinations in theory papers, duration of examination will be 1 hour for 3 credit courses and 2 hours for 4 credit courses

### 3.3. End-Semester examination:

- a) The semester end examination will cover the full syllabus of the course and will be conducted as per the Institutional time table at the end of each semester.
- b) For end –semester examinations in theory papers, duration of examination will be 1 hour for 3 credit courses and 2 hours for 4 credit courses
- c) For the end semester evaluation of seminar/research work, student will be expected to submit a written report and also make a presentation. The evaluation will be based on the quality of the written report and presentation.

### 3.4 Passes and Fail

- (a) The candidates who obtain 40% and more marks of the total marks of a course head shall be deemed to have **passed** the respective course head.
- (b) The candidates who obtain marks less than 40% of the total marks of a course head shall be deemed to have **failed** in the respective course head (**Grade FF**).

### 3.5 Grades:

- a) The performance of a student shall be documented by a **Letter grade**. Each letter grade has a **Grade point** associated with it. The Grades and Grade points shall be assigned to each head of passing and both will be indicated in the mark-list of the semester examination.
- b) The total marks (in-semester + end-semester) of a candidate in a subject head are converted into a letter grade, based on the relative (and some times the absolute) performance of the student.

<b>Letter Grade</b>	<b>Grade Point</b>
AA	10
AB	9
BB	8
BC	7
CC	6.5
CD	6
DD	5.5
EE	5

- c) For granting class, a grade point of 6.0 and above will be considered equivalent to First class.
- d) The grades to be allotted in the case of students who fail or do not appear at the end-semester examination shall be as under.

Letter Grade	Grade Point	Explanation
<b>FF</b>	0	The candidate fails in course head. The candidate will be allowed to take end-semester repeat or subsequent examinations as per rule.
<b>XX</b>		The candidate has not kept term for the course head due to attendance less than requisite. Further see 3.5(g) below. In the above cases, the candidate has to repeat the respective course by paying the fees.
<b>I</b>	0	The candidate has kept term for the course head, has taken all the internal examinations with satisfactory performance, but has failed to take the end-semester examination or repeat examination due to genuine reasons. The candidate will be allowed to take end-semester repeat or subsequent examinations as per rule.
<b>FR</b>	0	The candidate has exhausted all the permissible chances to clear the end-semester examinations. The candidate has to register for the respective semester again for all the subject heads or will be out of the respective degree course as per the rules.
<b>DR</b>	0	(i) The candidate hasn't participated in academic programme. (ii) The candidate has taken a drop for the subject head;  - provided he/she intimates the same (i or ii) at least 7 days in advance of the commencement of the end-semester examination for the respective year.

- e) Grades **FF** and **I** are place-holders only and do not enter into CPI/SPI calculations directly. These grades get converted to one of the regular grades after the end-semester examination
- f) A candidate with an **FR** grade is not eligible for any repeat examination in that course and has to re-register for that semester by paying the appropriate fees.
- g) **I** grade will not be continued beyond the permissible number of end-semester/repeat examinations.
- h) **'XX' Grade:** The grade **XX** in a course is awarded if – (i) candidate does not maintain the minimum 75% attendance in the Lecture/Tutorial/Practical classes, (ii) candidate receives less than 20% of the combined marks assigned for continuous assessment and mid-semester examination, and (iii) candidate indulges in a misconduct/uses unfair means in the examination, assignments, etc., of a nature serious enough to invite disciplinary action in the opinion of the teacher.
- (**Note:** Award of the **XX** grade in the case of g(iii) above shall be done by Disciplinary Action Committee (DAC)).
- i) The names/roll numbers of students to be awarded the **XX** grade should be communicated by the teacher to the Academic office as per academic calendar before the last date of submission of the application for end-semester examination

### 3.6. Awarding the grades

The grading scale ranks the students on a statistical basis on the basis of the overall performance of the students of a given class in the given course head. Therefore, statistical data on students' performance is a prerequisite for applying the grading system. While assigning grades in a given course head, it is essential to know the **average marks (AM)** obtained by the students *who have passed the subject head* and the **highest marks (HM)** obtained in the *same subject head*.

**3.6.1.** If the **average marks (AM)** obtained by the students *who have passed the subject head* is <60%, the interval AM shall be awarded grade CC and the other grades shall be decided as follows:

- i. AA, AB, BB, and BC grades shall be decided between the AM and HM by dividing the range in equal intervals.
- ii. CD, DD and EE grades shall be decided between the AM and minimum marks required for passing the head (i.e. 40%) by dividing the range in equal intervals.

**3.6.2.** If the **average marks (AM)** obtained by the students *who have passed the subject head* is such that **60% ≤ AM < 70%**, the interval AM shall be awarded grade BC and the other grades shall be decided as follows:

- (i) AA, AB, BB grades shall be decided between the AM and HM by dividing the range in equal intervals.
- (ii) CC, CD, DD and EE grades shall be decided between the AM and minimum marks required for passing the head (i.e. 40%) by dividing the range in equal intervals.

**3.6.3.** If the **average marks (AM)** obtained by the students *who have passed the subject head* is **≥ 70%**, the interval AM shall be awarded grade BB and the other grades shall be decided as follows:

- (i) AA and AB grades shall be decided between the AM and HM by dividing the range in equal intervals.
- (ii) BC, CC, CD, DD and EE grades shall be decided between the AM and minimum marks required for passing the head (i.e. 40%) by dividing the range in equal intervals.

## 4. SPI and CPI

- a) **Semester Performance Index (SPI):** The performance of a student in a semester is indicated by **Semester Performance Index (SPI)**, which is a weighted average of the grade points obtained in all the courses taken by the student in the semester and scaled to a maximum of 10. (SPI is to be calculated upto two decimal places.)

A Semester Grade Point Average (SGPA) will be computed for each semester as follows:

$$SGPA = \frac{\left( \sum_{i=1}^n c_i g_i \right)}{\left( \sum_{i=1}^n c_i \right)}$$

Where

'n' is the number of courses for the semester,

'c<sub>i</sub>' is the number of credits allotted to a particular course, and

'g<sub>i</sub>' is the grade-points awarded to the student for the course based on his performance as per the above table.

SGPA will be rounded off to the second place of decimal and recorded as such.

- b) **Cumulative Performance Index (CPI):** An up to date assessment of the overall performance of a student from the time he entered the Institute is obtained by calculating **Cumulative Performance Index (CPI)** of a student. The CPI is weighted average of the grade points obtained in all the courses registered by the student since he entered the Institute. CPI is also calculated at the end of every semester (upto two decimal places).

Starting from the first semester at the end of each semester (S), a Cumulative Grade Point Average (CGPA) will be computed as follows:

$$\text{CGPA} = \frac{\left( \sum_{i=1}^m c_i g_i \right)}{\left( \sum_{i=1}^m c_i \right)}$$

Where

'm' is the total number of courses from the first semester onwards up to and including the semester S,

'c<sub>i</sub>' is the number of credits allotted to a particular course, and

'g<sub>i</sub>' is the grade-points awarded to the student for the course based on his performance as per the above table.

CGPA will be rounded off to the second place of decimal and recorded as such.

- c) The CGPA, SGPA and the grades obtained in all the subjects in a semester will be communicated to every student at the end of every semester / beginning of the next semester.
- d) **When** a student gets the grade 'FF', or 'I' in any subject head during a semester, the SGPA and CGPA from that semester onwards will be tentatively calculated, taking only 'zero' grade point for each such 'FF' or 'I' grade. When the 'FF' grade(s) has / have been substituted by better grades after the repeat examination or subsequent semester examination, the SGPA and CGPA will be recomputed and recorded.

## 5. Repeat End-Semester Examination

**5.1.** For those candidates who fail in a subject head or are eligible for appearing at the repeat examination, **Repeat End-Semester Examination** will be conducted within one month from the declaration of the results of regular end-semester examination, as per **Regulation R.14**.

**5.2.** The marks obtained by candidates in the in-semester examinations (continuous assessment and Mid-Semester Examination) will be carried forward in such cases.

**5.3. Grading the performance in the Repeat Examination:** The grades will be assigned as per 3.5 and 3.6 above. However, for a candidate taking any repeat examination or subsequent regular semester examination or performance improvement examination shall be awarded **one grade lower** than that decided on the basis of the actual marks obtained; provided 'EE' grade obtained in such an examination shall remain 'EE'. For reference see the table below.

<b>Grade obtained in repeat or subsequent end-semester examination</b>	<b>Grade to be assigned</b>	<b>Grade point</b>
AA	AB	9.0
AB	BB	8.0
BB	BC	7.0
BC	CC	6.5
CC	CD	6.0
CD	DD	5.5
DD	EE	5.0
EE	EE	5.0

**5.4. Revaluation of end-semester and repeat examination: Candidate's performance in these examinations will be displayed on proper notice board and after 3 days of such display the marks will be sent to the Academic Office. No revaluation of these examinations will be allowed.**

## **6. Passing of a Semester examination**

A candidate shall be declared as '**PASSED**' any semester examination if he/she has

- a) Cleared all heads of passing by securing grades EE or higher in all the heads;
- b) Passed all the heads of passing such as project, seminar, training, etc as per the rules;
- c) Satisfactorily completed all the mandatory requirements of the course;
- d) paid all the Institute dues;
- e) No case of indiscipline pending against him/her.

## **7. Eligibility for the Award of a Degree**

A candidate shall be declared eligible for the award of a degree, if he/she has cleared all the semester examinations as given in (6) above.

## **8. Allowed to keep terms (ATKT)**

**8.1** A candidate who has I grade in one or more heads of passing of an odd semester of an academic year shall be allowed to keep terms for the respective even semester.



**8.2.** A candidate shall be allowed to keep terms for the subsequent academic year if he/she has FF or I grades in not more than two heads of passing from all the heads of passing of the two terms of the previous academic year taken together. Such a candidate shall be declared as **FAILED, ATKT**.

## **9. Repeating a course**

**9.1** A student is required to repeat the course under the following situations:

- (a) A student who gets an **XX, FR, or DR** grade in a course; or
- (b) A student has exhausted all permissible chances to clear the course.

**9.2** A candidate from first year who remains absent for the regular end-semester examination of a semester and the corresponding repeat examination for **ALL SUBJECTS** shall have to take fresh admission for the corresponding year; unless the candidate has dropped out / terminated from the course.

**9.3** If a candidate at the Second, fails to pass any semester examination in not more than 4 consecutive examinations, including the repeat examinations, from the date of registering for the respective year, the candidate shall have to take readmission for the corresponding year again in which the failure has occurred, provided the course is not changed.

## **10. Improvement of performance**

A candidate will be allowed to appear at the **entire examination** after the regular end-semester examination as per the respective rules to improve the performance. In such a case if the result of the examination repeated –

- 1) Is better than the previous one, the previous result shall be declared null and void; and
- 2) Is worse than the previous one, the result of the subsequent examination shall not be declared.
- 3) However, awarding of final grade will be made under the provision of sub clause 5.3 above.

## **11. Exit rules for poorly performing students**

A candidate shall be excluded from a course under the following conditions:

- (a) If he/she fails to pass any semester examination of the any year of the course in not more than four consecutive attempts (Examination conducted by Institute) from the date of joining the course.
- (b) If he/she does not keep two consecutive terms without giving any reasonable justification (as prescribed by the institute) for doing so.
- (c) If a candidate fails to fulfil all the requirements of his/her respective degree within the prescribed period from the date of taking admission to the course, the candidate shall be excluded from the course.

## **12. Miscellaneous**

- (a) Although CPI will be given in the Semester grade report, the final degree certificate will not mention any **Class** whatsoever.

(b) Notwithstanding anything said above if a course is revised /restructured then transient provisions applicable at the time of revision /restructuring shall be applicable.

**Syllabus Structure -Master's courses**

**Perfumery and Flavour Technology**

Semester I										
Content	Subject Code	Subjects	Credits	Hrs/Week			Marks for various Exams			
				L	T	P	Continuous Assessment	Mid-semester Examination	Final Examination	Total
<b>Core I</b>	<b>PFT 2101</b>	Chemistry of Ingredients in Fragrance and flavors	3	2	1	0	10	15	25	50
<b>Core II</b>	<b>PFT 2102</b>	Technology of Fragrance and flavors	3	2	1	0	10	15	25	50
<b>Core III</b>	<b>PFT 2103</b>	Creation of Fragrance and flavors	3	2	1	0	10	15	25	50
<b>Elective I</b>			3	2	1	0	10	15	25	50
<b>Elective II</b>			3	2	1	0	10	15	25	50
<b>Seminar and Critical Review</b>	<b>PFP 2002</b>		3	0	0	6	Seminar -35 (Report-20 Presentation-15) Critical Review-15 (Report-10 Presentation-5)			50
<b>Practical I</b>	<b>PFP2001</b>	Olfaction and Sensory Education	3	0	0	6	25	-	25	50
<b>Research I</b>	<b>PFP2003</b>		6	-	-	12	-	-	-60 (Report) 40 (Presentation)	100
<b>TOTAL</b>			27	10	5	24	-	-	-	450

**Sem I: Electives**

1. **PFT 2104** Cosmetics Chemistry and Technology
2. **PFT 2005** Analytical chemistry and quality control techniques

Semester II										
Content	Subject Code	Subjects	Credits	Hrs/Week			Marks for various Exams			
				L	T	P	Continuous Assessment	Mid-semester Examination	Final Examination	Total
<b>Core I</b>	<b>PFT 2007</b>	Natural products for Fragrance and flavors	3	2	1	0	10	15	25	50
<b>Core II</b>	<b>PFT 2008</b>	Marketing Management and Costumer Behavior	3	2	1	0	10	15	25	50
<b>Core III</b>	<b>PFT 2108</b>	Application of Fragrance and flavors	3	2	1	0	10	15	25	50
<b>Elective III</b>			3	2	1	0	10	15	25	50
<b>Elective IV</b>			3	2	1	0	10	15	25	50
<b>Practical II</b>	<b>PFP 2002</b>	Blending and Creation for Fragrance and Flavors	3	0	0	6	25	-	25	50
<b>Research II</b>	<b>PFP 2004</b>		9	-	-	18	-	-	90 (Report) 60 (Presentation)	150
<b>TOTAL</b>			<b>27</b>	<b>10</b>	<b>5</b>	<b>24</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>450</b>

**Sem II: Electives:**

1. **PFT2009** Technology and Science of Essential Oils
2. **PFT2013** Separation process in perfumes and flavor industry
3. **PFT2012** Synthetic perfumes and flavor chemistry

4. **PFT2112** Production of Aroma Chemicals

Semester III										
Content	Subject Code	Subjects	Credits	Hrs/Week			Marks for various Exams			
				L	T	P	Continuous Assessment	Mid-semester Examination	End-semester Examination	Total
Core I	PFP2005	In plant training (15 Weeks to 6 months)	30			40			450	450

Semester IV										
Content	Subject Code	Subjects	Credits	Hrs/Week			Marks for various Exams			
				L	T	P	Continuous Assessment	Mid-semester Examination	End-semester Examination	Total
Core I	PFP2006	Research, Thesis and Open defense	30			40			450	450

**\*\*Sem III and Sem IV Evaluation will conducted be at end of IV semester.**

### Semester I

<b>Course Code:</b> PFT2101	<b>Course Title:</b> Chemistry of Ingredients in Fragrance and flavors	<b>Credits = 3</b>		
		<b>L</b>	<b>T</b>	<b>P</b>
<b>Semester: I</b>	<b>Total contact hours: 45</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>				
a) HSC chemistry, B.Tech in any branches of Chemical Technology				
<b>List of Courses where this course will be prerequisite</b>				
a) Formulation and creation of flavours and fragrances				
b) Applications of cosmetics, aroma chemicals in various fields				
<b>Description of relevance of this course in the M. Tech programme</b>				
a) The course will enable the students to understand basic chemical ingredients used in the Fragrance and Flavour industry for making fragrance and flavour.				
<b>Sr.No.</b>	<b>Course Contents (Topics and subtopics)</b>	<b>Reqd. hours</b>		
1	Perfumery chemicals, classification of perfumes and flavours according to characteristic group present,	02+01		
2	Resources of raw materials used in perfumery and flavor chemicals, Chemistry of perfumes and flavours raw materials, Unit processes involved, different reagents used, Selection of process for industry	02+01		
3	Important chemical reactions involved in converting raw materials to perfumery and flavour chemicals,	02+01		
4	Synthetic methods for various functional groups Alcohols for Fragrance and flavour applications, their Classification and synthesis	03+01		
5	Aldehydes Fragrance and flavour applications, their Classification and synthesis	04+02		
6	Esters, Ketones, ethers used in Fragrance and flavour industry and their synthesis Lactones, Amines, Phenols, Nitro compounds used in Fragrance and flavour applications and their synthesis	03+01		
7	Heterocyclic, Macrocyclic and alicyclic compounds in Fragrance and flavour applications and their synthesis	02+01		
8	Exposure to various chemicals used in flavour creation and blending, smell / odour and taste contribution from these in flavours.	06+03		
9	Biogenesis of flavours in fruits and vegetables, reaction flavours, off flavours. Flavour enhancers / chemicals.	03+01		
10	Isolation and re-enforcement of top notes in flavour formulation/foods.	02+01		
11	Analytical tools in QC/QA. Overview of Sensory evaluation and the role in selecting aroma chemicals Flavour creation, synergetic effect in blending.	02+01		

<b>List of Text Books/ Reference Books</b>	
1	Aroma Science – S. P. Gimelli
2	Fragrance Chemistry – E. T. Theimer
3	Perfumery and Flavoring synthetics – Bedaukian
4	Unit Processes in Organic Synthesis-, P.H. Groggins, TaTa-McGraw Hill publication
5	Chemistry and Technology of Flavours and Fragrances-David Rowe, Wiley Publications
<b>Course Outcomes (students will be able to....)</b>	
1	Appreciate the significance of chemistry in Fragrance and Flavour industry
2	Unit process in Fragrance and Flavour industries
3	Synthesis of various fragrance and flavour ingredients

<b>Course Code: PFT2102</b>	<b>Course Title: Technology of Fragrance and flavors</b>	<b>Credits = 3</b>		
		<b>L</b>	<b>T</b>	<b>P</b>
<b>Semester: I</b>	<b>Total contact hours: 45</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>				
a) HSC chemistry, B.Tech in any branches of Chemical Technology				
<b>List of Courses where this course will be prerequisite</b>				
a) Formulation of fragrances and flavours				
b) Applications of technology and basics in the field of FMCG products				
<b>Description of relevance of this course in the M. Tech programme</b>				
a) The course will enable the students to understand basic Technology involved in Fragrance and Flavour industry for making fragrance and flavour.				
<b>Sr.No.</b>	<b>Course Contents (Topics and subtopics)</b>	<b>Reqd. hours</b>		
1	History of perfumes, Perfumery raw materials, classification of odor, odor type and odorants	04+ 01		
2	Jean Carle's perfumery pyramid, evaluation techniques of perfumery ingredients	06+03		
3	Study on application of fragrance and perfume into different FMCG products	04+01		
4	Systematic approach to understanding flavour formation during food processing, food matrix, interaction of added flavours.	02+ 01		
5	Understanding of terms like, Flavour and Flavouring agents. Attributes of flavour, taste, odour, odour stimulation, basic tastes and the human olfactory system.	03+01		
6	Flavour enhancers, modifiers, precursors, suppressors, major chemicals and raw materials, solvents.	03+02		

7	Forms of flavour and the manufacturing processes involved all types of flavours. Aroma recovery during processing.	02+01
8	Legal aspects (natural flavours and natural flavouring substances, nature identical flavouring substances, artificial flavouring substances), and the FSSA act.	04+02
9	Selection and application of flavours in foods and beverages	02+ 02
<b>List of Text Books/ Reference Books</b>		
1	Perfume and flavor materials of natural origin - Arctander	
2	Common fragrance and flavor materials – Bauer	
3	Chemistry and technology of flavor fragrances – D. J. Rowe	
<b>Course Outcomes (students will be able to....)</b>		
1	Manufacturing processes of perfumes and flavours	
2	Application of fragrances/flavours into different FMCG products	
3	Quality control in manufacturing process, legal aspects, classification of odour and odorants.	

<b>Course Code: PFT2103</b>	<b>Course Title:</b> Creation of fragrance and flavors	<b>Credits = 3</b>		
		<b>L</b>	<b>T</b>	<b>P</b>
<b>Semester: I</b>	<b>Total contact hours: 45</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>				
a) HSC chemistry, B.Tech in any branches of Chemical Technology				
<b>List of Courses where this course will be prerequisite</b>				
a) Perfumery technology				
b) Application based study				
<b>Description of relevance of this course in the M. Tech programme</b>				
a) The course will enable the students to understand basic formulation and sensory analysis and enhance the creation aspect.				
<b>Sr.No.</b>	<b>Course Contents (Topics and subtopics)</b>	<b>Reqd. hours</b>		
1	Introduction to fragrances, types of fragrance	04+ 01		
2	ABCs of perfumery, odour aspects of perfumes, fragrance pyramid, fragrance families	06+01		
3	Current trends in fragrances, sensory analysis of different products	05+03		
4	Study of legendry perfumes	03+ 02		
5	Introduction to flavors, types of flavors, flavor raw materials,	03+01		
6	Stability of flavor in food, sensory evaluation of flavours in foods	03+02		
7	Various flavor formulation	06+05		
<b>List of Text Books/ Reference Books</b>				

- 1 Perfumes art, science and technology – Muller
- 2 Fenaroli's handbook of flavor ingredients – G. A. Burdock

**Course Outcomes (students will be able to....)**

- 1 Introduction to fragrances and flavour industry, their types, raw materials, odour aspects, etc.
- 2 Fragrance pyramid, fragrance and flavour families, sensory analysis of different products.
- 3 Formulation methods, how different factors affects the formulation process in F and F industry like current trends, raw material cost, consumer demands, etc.

<b>Course Code: PFT 2104</b>	<b>Course Title: Cosmetics Chemistry and Technology</b>	<b>Credits = 3</b>		
<b>Elective I</b>		<b>L</b>	<b>T</b>	<b>P</b>
<b>Semester: I</b>	<b>Total contact hours: 45</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>				
a) HSC chemistry, B.Tech in any branches of Chemical Technology				
<b>List of Courses where this course will be prerequisite</b>				
a) Applications in FMCG based products				
b) Cosmetic formulations				
<b>Description of relevance of this course in the M. Tech programme</b>				
a) The course will enable the students to understand interaction of fragrances with cosmetic bases involved in Fragrance and Flavour industry.				
<b>Sr.No.</b>	<b>Course Contents (Topics and subtopics)</b>	<b>Reqd. hours</b>		
1	Soaps cleansing preparation for skin, hair and teeth	04+02		
2	Physiology of skin, hair and tooth	02+01		
3	Soaps cleansing preparation for teeth	02+01		
4	Basic cosmetic skin care products - emulsion, cream and lotions	02+02		
5	Powders, emulsifier, thickeners and gums	02+01		
6	Cosmetic cleansing preparations	03+02		
7	Specialty products - sun protection, skin lightening etc.,	04+01		
8	Raw materials in cosmetics: water, oils , fats and waxes, and other raw materials	04+02		
9	Herbal cosmetics, cosmaceuticals and ISI guidelines ,	03+01		
10	Manufacturing processes of cosmetics	04+02		
<b>List of Text Books/ Reference Books</b>				
1	Perfume and flavor materials of natural origin - arctander			
2	Fragrance Chemistry – E. T. Theimer			
3	Natural ingredients in cosmetics II – P. Fridd			



**Course Outcomes (students will be able to....)**

- 1 Gets acknowledged with the functioning of cosmetic industry.
- 2 Manufacturing of different cosmetic products, interaction of fragrance material with the cosmetic base
- 3 Market trends in cosmetics

<b>Course Code: PFT 2005</b> <b>Elective II</b>	<b>Course Title:</b> Analytical chemistry and quality control techniques	<b>Credits = 3</b>		
		<b>L</b>	<b>T</b>	<b>P</b>
<b>Semester: I</b>	<b>Total contact hours: 45</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>				
a) HSC chemistry, B.Tech in any branches of Chemical Technology				
<b>List of Courses where this course will be prerequisite</b>				
a) Synthesis of ingredients for perfumes and flavours				
b) Applications in f & f products				
<b>Description of relevance of this course in the M. Tech programme</b>				
a) The course will enable the students to understand analytical aspect involved in Fragrance and Flavour industry.				
<b>Sr.No.</b>	<b>Course Contents (Topics and subtopics)</b>	<b>Reqd. hours</b>		
1	Spectroscopic techniques: NMR, IR, Mass, Spectrometry. Separation techniques: HPLC, GC, LC, etc. Electrophoresis, CO <sub>2</sub> Supercritical extraction.	12+05		
2	Analysis of Food Volatiles Using Headspace-Gas Chromatographic Techniques. The Analysis of Food Volatiles Using Direct Thermal Desorption. Solid-Phase Microextraction for the Analysis of Aromas and Flavors. The Advantages of GC-TOFMS for Flavor and Fragrance Analysis Modern Methods for Isolating and Quantifying Volatile Flavor and Fragrance Compounds	04+02		
3	SPME Comparison Studies and What They Reveal Analysis of Volatile Compounds in the Headspace of Rice Using SPME/GC/MS Headspace Techniques for the Reconstitution of Flower Scents and Identification of New Aroma Chemicals SPME Applications in Consumer Products Gas Chromatography.	06+03		
4	Olfactometry in Food Aroma Analysis Quantitative Use of Gas Chromatography. Olfactometry: The GC-"SNIF" Method Combining Mass Spectrometry and Multivariate Analysis to Make a Reliable and Versatile Electronic Nose Character	08 +05		

Impact Compounds: Flavors and Off-Flavors in Foods

**List of Text Books/ Reference Books**

- 1 Cosmetic raw material analysis and quality – Hilda Butler  
Chemistry and Technology of Flavours and Fragrances-David Rowe, Wiley
- 2 Publications

**Course Outcomes (students will be able to....)**

- 1 Studied various techniques used for the analysis of raw materials, essential oils and aroma chemicals.
- 2 Modern methods for isolating and quantifying volatile flavour and fragrance compounds.

<b>Course Code: PEP 2001</b>	<b>Course Title: Olfaction and Sensory Education</b>	<b>Credits = 3</b>		
		<b>L</b>	<b>T</b>	<b>P</b>
<b>Semester: I</b>	<b>Total contact hours: 45</b>	<b>1</b>	<b>0</b>	<b>2</b>
<b>List of Prerequisite Courses</b>				
a) HSC chemistry, B.Tech in any branches of Chemical Technology				
<b>List of Courses where this course will be prerequisite</b>				
a) In formulations				
b) Applications of fine fragrances and flavors				
<b>Description of relevance of this course in the M. Tech programme</b>				
a) The course will enable the students to develop olfactive senses and memory for making fragrance and flavour.				
<b>Sr.No.</b>	<b>Course Contents (Topics and subtopics)</b>	<b>Reqd. hours</b>		
1	<b>Olfaction:</b> Memorisation of different raw materials used in perfumery, perfume language, Memorisation of perfumes, production, extraction processes  Quality control of raw materials.	15 (Practical)+05(Theory discussion)		
2	<b>Sensory education:</b> Common characteristics of sensory systems, Vision, olfaction and tactile sensory evaluation, Organoleptic control Organoleptic properties of cosmetic products, aspect, colour, smell, touch	15 (Practical) +10 (Theory discussion)		
<b>List of Text Books/ Reference Books</b>				

- 1 Perfume and flavor materials of natural origin - arctander
- 2 Fragrance Chemistry – E. T. Theimer
- 3 Common fragrance and flavor materials – Bauer

**Course Outcomes (students will be able to....)**

- 1 Appreciate the significance of Olfactive sense in Fragrance and Flavour industry
- 2 Characteristic distinction of odors *w.r.t* their functional groups
- 3 Learning the skill to differentiate between a natural and synthetic aroma chemicals

**PFP 2002 Seminar and Critical Review**

**Course Outcomes:**

1. Survey literature related to the given topic
2. Analyze the reported outcomes and classify the work under key categories
3. Write a technically correct report as per the suggested guidelines and present the seminar work

**Syllabus:**

The Seminar work is concerned with a detailed and critical review of an area of interest to Chemical Engineering. Typically, the report should contain and will be evaluated based on the following points:

- (a) Introduction: 2 pages maximum,
  - (b) Exhaustive review of literature (including figures): 10 – 12 pages: 50% Weightage
  - (c) Critical analysis of the literature and comments on the analysis Critical analysis should also contain quantitative comparison of observations, results, and conclusion amongst the various papers.
2. Two typed copies of the report on thesis size bond paper (297 mm x 210 mm) are to be submitted to Coordinator on **time to be decided by the coordinator.** The detailed timetable for the presentation would be communicated.
  3. The report should be prepared using the Times Roman font (size 12) using 1 1/2 spacing leaving 1-inch margin on all sides producing approximately 29 lines per page. The report should be typed on one side of the paper and need not be bound in a hard cover binding. Figures and tables should be shown as a part of the running text. Each figure should be drawn inside a rectangular box of 12 cm width and 10 cm height. The figures must be sufficiently clear and hand drawn figures will be acceptable. Particular care must be taken if a figure is photocopied from source. Each figure must have a sequence number and caption below. Each table must have a sequence number and title at the top.

4. Name of the student, title of the problem and year of examination must be indicated on the top cover. THE NAME OF THE SUPERVISOR (ONLY INITIALS) MUST APPEAR ON THE BOTTOM RIGHT CORNER OF THE TOP COVER.
5. The report must be precise. All important aspects of the topic should be considered and reported. **The total number of pages, including tables, figures, and references should not exceed 30.** Chapters or subsections need not be started on new pages, while getting the report typed.
6. Typographical errors in the report must be corrected by the student. The student will be discredited for any omission in the report. All the symbols used in the text should be arranged in an alphabetical order and given separately after conclusions.
7. The list of references should be arranged in alphabetical order of the names of authors. In the text, the reference should be cited with author's name and year. (author – date style) For example:
  - (i) The flow pattern in gas-liquid-solid fluidized bed has been reported in the published literature (Murooka et al., 1982).

**OR**

- (ii) Murooka et al. (1982) have measured flow patterns in gas-liquid-solid fluidized beds. The title of the article should also be included. The references must be given in the following standard format.
  - (a) Format for listing references of articles from periodicals: Murooka S., Uchida K. And Kato Y., Recirculation Turbulent Flow of Liquid in Gas-Liquid-Solid Fluidised Bed”, J. Chem. Engg. Japan, 15, 29-34 (1982).
  - (b) Format for listing references of Books:

Constant R.F.,”Crystallization, Academic Press, New York, pp. 89-90, 1968.
  - (c) Format for listing Thesis:

Niranjan K., “Hydrodynamic and Mass Transfer Characteristics of Packed Columns”, Ph.D. (Tech.) Thesis, University of Mumbai, 1983.
  - (d) Format for listing references of Patents in Chemical Abstracts:

Cananaush R.M., U.S.Patent 2,647,141, Cf. C.A. 48, 82636 (1954).
  - (e) Format for listing Handbooks, Tables, Symposia etc.:

Kumar R and Kuloor N.R., “Formation of Drops and Bubbles”, in Advances in Chemical Engineering, Vol.8, T.B. Drew et.al. (Eds.) New York, Academic Press, pp.256-364 (1970).

(f) Format for listing Private Communications and other categories:

Sharma, M.M., Private Communication (1984).

8. Consistency of units should be maintained in the written report. SI systems should be used. [For SI system – Ref: Ind. Chem. Engr., 24, 32, 3 (1983)]. Units used in the literature (if not SI) should be correctly converted.
9. The time allotted for the oral presentation of seminar is 20 minutes: additional 10 minutes are provided for questions and answers.
10. INCOMPLETE AND CARELESSLY WRITTEN REPORT IS LIABLE TO BE REJECTED.
11. The last date for submission will NOT be extended on any grounds whatsoever.
12. There must not be any acknowledgment about the guidance by the faculty in the Seminar.
13. The Seminar will be evaluated on the basis of (i) rational approach to the problem, ii) correctness and completeness of the written text and iii) performance in the oral presentation.
14. Word-to-word copying from the published article is not permitted.

The submitted report will be evaluated by the research guide and an external examiner from the Department/Industry based on the presentation made by the candidate. A suitable combination of the marks for report and presentation will be considered for the final evaluation.

### **PFP 2003 – Research Project I**

#### **Course Outcomes:**

1. Analyze existing literature for research topic and develop detailed plan of experiments/simulations
2. Systematically perform experiments/modeling activity to accomplish the set objectives
3. Critically analyse the results and write a technically correct report as per the suggested guidelines and present the work

#### **Details:**

The Research project I is concerned with detailed literature review of the assigned research area in consultation with the guide, developing an experimental/simulation protocol and initiate the actual research work. Based on the outcomes of the candidate is expected to submit a report as per similar guidelines provided for **PFP 2002** above which will be evaluated by the research guide and an external examiner from the Department/Industry based on the presentation made by the candidate. A suitable combination of the marks for report and presentation will be considered for the final evaluation.

## Semester II

<b>Course Code: PFT 2007</b>	<b>Course Title:</b> Natural Products for Fragrance and Flavours	<b>Credits = 3</b>		
		<b>L</b>	<b>T</b>	<b>P</b>
<b>Semester: II</b>	<b>Total contact hours: 45</b>	<b>2</b>	<b>1</b>	<b>0</b>
<p><b>List of Prerequisite Courses</b></p> <p>a) HSC chemistry, B.Tech in any branches of Chemical Technology</p> <p><b>List of Courses where this course will be prerequisite</b></p> <p>a) Separation and extraction technique</p> <p>b) Biosynthesis of aroma chemicals</p> <p><b>Description of relevance of this course in the M. Tech programme</b></p> <p>a) The course will enable the students to understand the biosynthetic pathway and physiology of raw material involved in Fragrance and Flavour industry for making fragrance and flavour.</p>				
<b>Sr.No.</b>	<b>Course Contents (Topics and subtopics)</b>	<b>Reqd. hours</b>		
1	Natural Source of perfumery and flavoring ingredients: Plants, animals, cultivation and application	05 + 02		
2	Chemistry of Natural products: Classification of ingredients, identification, biogenesis of terpenoids, phenyl propenoids, etc	05 + 03		
3	Quality Control: Mint, Sandal wood, Citrous compounds and Muskone and related compounds, spices, aromatic herbs	05 + 03		
4	Extraction and isolation: Extraction techniques for the separation of volatile oils from natural source including supercritical fluid extraction methods of isolation of important ingredients.	15 + 07		
<p><b>List of Text Books/ Reference Books</b></p> <p>1 Perfume and flavor materials of natural origin - arctander</p> <p>2 Perfumery and flavoring materials - Bedaukian</p> <p>3 Common fragrance and flavor materials – Bauer</p> <p><b>Course Outcomes (students will be able to....)</b></p> <p>1 Natural source of perfumery and flavoring ingredients along with the knowledge of their chemistry and biosynthesis.</p> <p>2 Physiology of plant materials, extraction and isolation techniques</p>				

<b>Course Code: PFT 2008</b>	<b>Course Title:</b> Marketing management and customer behavior	<b>Credits = 3</b>		
		<b>L</b>	<b>T</b>	<b>P</b>
<b>Semester: II</b>	<b>Total contact hours: 45</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>				
a) HSC chemistry, B.Tech in any branches of Chemical Technology				
<b>List of Courses where this course will be prerequisite</b>				
a) Formulation and application				
b) New Product Development				
<b>Description of relevance of this course in the M. Tech programme</b>				
a) The course will enable the students to understand consumer insight, current marketing trends and marketing mix involved in Fragrance and Flavour industry.				
<b>Sr.No.</b>	<b>Course Contents (Topics and subtopics)</b>	<b>Reqd. hours</b>		
1	Evolution of marketing concept, sales, marketing, corporate and social responsibility.	04 + 01		
2	Understanding consumer behavior and Industrial buying decision process, trends, environmental factors /life styles	06 + 01		
3	Market research, Market potential , market share, Product development , product attributes, life cycle, product up-gradation, substitution, pricing, advertisement, distribution, marketing mix, market planning , dynamics in product positioning , branding ,competitive scenario.	08+ 08		
4	Marketing brief, product brief, and customer interaction in co-creating new blends, application evaluation of new blends, consumer insight, role of Key Account Manager	06+ 03		
5	Overview of new sales platforms, AI concept, digital marketing	06+ 02		
<b>List of Text Books/ Reference Books</b>				
1 Marketing management – Kotler				
2 Marketing research – Luck				
<b>Course Outcomes (students will be able to....)</b>				
1 Current marketing trends and strategies.				
2 Consumer Insight and its effect on the development of new product and the success of the products in market.				

<b>Course Code: PFT 2108</b>	<b>Course Title:</b> Application of Fragrance and flavors	<b>Credits = 3</b>		
		<b>L</b>	<b>T</b>	<b>P</b>
<b>Semester: II</b>	<b>Total contact hours: 45</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>				
a) HSC chemistry, B.Tech in any branches of Chemical Technology				
<b>List of Courses where this course will be prerequisite</b>				
a) Applications of flavours and perfumes				
b) Cosmetic formulations				
<b>Description of relevance of this course in the M. Tech programme</b>				
a) The course will enable the students to understand stability of fragrances and legal aspects involved in cosmetics				
<b>Sr.No.</b>	<b>Course Contents (Topics and subtopics)</b>	<b>Reqd. hours</b>		
1	Decorative cosmetics, Color science, Pigments and dyes	02+02		
2	Color cosmetic formulations beauty and salon treatment	04+01		
3	Aroma therapy	04+03		
4	Cosmetic product development sequence and logic techniques of product development, Stability testing of Cosmetics, Quality control of Cosmetic preparations, Market trends in cosmetics and toiletries	08+03		
5	Efficacy testing and clinical trials	02+01		
6	Sensorial evaluation and psychophysiology	04+03		
7	Packaging materials in cosmetics	04+01		
8	Cosmetics Rules and Regulations	02+01		
<b>List of Text Books/ Reference Books</b>				
1 Cosmetics science and technology – E. Sagarin				
2 Cosmetology: Theory and practice – K. Schrader				
3 The science of cosmetics – J. V. Simmons				
<b>Course Outcomes (students will be able to....)</b>				
1 Marketing trends in cosmetic industry.				
2 Stability of fragrances in cosmetic products.				
3 Aromatherapy and its benefits				



<b>Course Code: PFT 2009</b>	<b>Course Title:</b> Technology and science of essential oils	<b>Credits = 3</b>		
<b>Elective</b>		<b>L</b>	<b>T</b>	<b>P</b>
<b>Semester: II</b>	<b>Total contact hours: 45</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b> a) HSC chemistry, B.Tech in any branches of Chemical Technology <b>List of Courses where this course will be prerequisite</b> a) Extraction b) Analysis of essential oils <b>Description of relevance of this course in the M. Tech programme</b> a) The course will enable the students to understand science of essential oils.				
<b>Sr.No.</b>	<b>Course Contents (Topics and subtopics)</b>	<b>Reqd. hours</b>		
1	Introduction to essential oil, production of essential oil	06+03		
2	Raw materials, processing, purification and isolation of essential oil reconstitution of essential oil	08+ 05		
3	Aroma chemicals (lemongrass oil, citronella oil, plama rosha oil, turpentine oil, mint oil, sandalwood oil etc.	08+02		
4	Analysis and quality control in industry.	08+05		
<b>List of Text Books/ Reference Books</b> 1 The essential oils vol. I to VI – Guenther 2 The chemistry of essential oils – D. G. Williams <b>Course Outcomes (students will be able to....)</b> 1 Basics and production of essential oils. 2 Extraction and application techniques of essential oils 3 Analysis and quality control in industry.				

<b>Course Code: PFT 2012</b>	<b>Course Title: Synthetic perfume and flavor chemistry</b>	<b>Credits = 3</b>		
<b>Elective</b>		<b>L</b>	<b>T</b>	<b>P</b>
<b>Semester: II</b>	<b>Total contact hours: 45</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>				
a) HSC chemistry, B.Tech in any branches of Chemical Technology				
<b>List of Courses where this course will be prerequisite</b>				
a) Manufacturing of aroma chemicals				
b) Separation and purification of aroma chemicals				
<b>Description of relevance of this course in the M. Tech programme</b>				
a) The course will enable the students to understand synthetic derivatives of natural aroma chemicals involved in Fragrance and Flavour industry for making fragrance and flavour.				
<b>Sr.No.</b>	<b>Course Contents (Topics and subtopics)</b>	<b>Reqd. hours</b>		
1	Synthesis of different perfumes and flavor compounds	12+ 05		
2	Choice of different routes of synthesis and raw materials with reference to cost and quality	08+ 05		
3	purification of aroma chemicals from petrochemicals, aroma chemicals based on natural essential oils (sandal aroma chemicals, musk compounds, amber woody chemicals etc)	10 + 05		
<b>List of Text Books/ Reference Books</b>				
1 Chemistry and technology of flavor fragrances – D. J. Rowe				
<b>Course Outcomes (students will be able to....)</b>				
1 Synthetic pathways of various aroma chemicals like menthol, sandalore, bacdenal, citral, macrocyclic musk, amber woody chemicals, etc.				
2 Separation, purification and isolation techniques of aroma chemicals.				
3 Conversion of low end-products to high end-products.				

<b>Course Code: PFT 2013</b>	<b>Course Title:</b> Separation process in perfumes and flavor industry	<b>Credits = 3</b>		
		<b>L</b>	<b>T</b>	<b>P</b>
<b>Semester: II</b>	<b>Total contact hours: 45</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>				
a) HSC chemistry, B.Tech in any branches of Chemical Technology				
<b>List of Courses where this course will be prerequisite</b>				
a) Separation, purification and isolation				
b) Basic techniques				
<b>Description of relevance of this course in the M. Tech programme</b>				
a) The course will enable the students to understand Separation purification and isolation in fragrance and flavour industry				
<b>Sr.No.</b>	<b>Course Contents (Topics and subtopics)</b>	<b>Reqd. hours</b>		
1	Various techniques used for isolation and purification of perfumes and flavor compounds	04+02		
2	Distillation	08+04		
3	Extraction, supercritical fluid extraction,	06+02		
4	Evaporation,	04+01		
5	Crystallization,	04+01		
6	Adsorption	02+01		
7	Equipment and process design	08+04		
<b>List of Text Books/ Reference Books</b>				
1 Extraction with supercritical gases – Schneider G. M.				
2 Distillation: Principles and design procedures – Hengstebeck R. J.				
3 Unit operations – Brown G. G.				
4 Unit processes and principles of chemical engineering – Glesen J. C.				
5 Unit processes and principles of chemical engineering – Olesen J. C.				
6 Unit processes in organic chemical industries – Desikan P.				
7 Unit processes in organic syntheses – Groggins P. H.				
<b>Course Outcomes (students will be able to....)</b>				
1 Different methods used for separation, purification and isolation of perfumes and flavours like distillation, extraction, crystallization, etc.				
2 Applications in f and f industry				
3 The scope and advancement in the purification and isolation processes.				

<b>Course Code: PFT 2112</b>	<b>Course Title: Production of aroma chemicals</b>	<b>Credits = 3</b>		
		<b>L</b>	<b>T</b>	<b>P</b>
<b>Semester: II</b>	<b>Total contact hours: 45</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>				
a) HSC chemistry, B.Tech in any branches of Chemical Technology				
<b>List of Courses where this course will be prerequisite</b>				
<b>Description of relevance of this course in the M. Tech programme</b>				
a) The course will enable the students to understand basic Technology involved in Fragrance and Flavour industry for making fragrance and flavour.				
<b>Sr.No.</b>	<b>Course Contents (Topics and subtopics)</b>	<b>Reqd. hours</b>		
1	Functions of different parts of reaction unit	03+01		
2	Different reactions used in aroma chemical industry, aldol condensation, saponification, oximation, esterification, oxidation, etc	07+04		
3	Safety, repair maintenance of different parts of reaction units	02+01		
4	Hydrogenation	06+03		
5	Distillation of essential oils	06+02		
6	Solvent extraction of aromatic plants	06+03		
<b>List of Text Books/ Reference Books</b>				
1 Perfume and flavor materials of natural origin - arctander				
2 Fragrance Chemistry – E. T. Theimer				
3 Perfumery and Flavoring synthetics – Bedaukian				
4 Common fragrance and flavor materials – Bauer				
5 Chemistry and Technology of Flavours and Fragrances-David Rowe, Wiley Publications				
<b>Course Outcomes (students will be able to....)</b>				
1 Appreciate the significance of chemistry in Fragrance and Flavour industry				
2 Unit process in Fragrance and Flavour industries				
3 Synthesis of various fragrance and flavour ingredients				

<b>Course Code: PFP 2002</b>	<b>Course Title:</b> Blending and Creation for Fragrance and Flavors	<b>Credits = 3</b>		
		<b>L</b>	<b>T</b>	<b>P</b>
<b>Semester: II</b>	<b>Total contact hours: 45</b>	<b>0</b>	<b>1</b>	<b>2</b>
<b>List of Prerequisite Courses</b> a) HSC chemistry, B.Tech in any branches of Chemical Technology <b>List of Courses where this course will be prerequisite</b> a) Formulation b) Application in various products <b>Description of relevance of this course in the M. Tech programme</b> a) The course will enable the students to develop the creation aptitude.				
<b>Sr.No.</b>	<b>Course Contents (Topics and subtopics)</b>	<b>Reqd. hours</b>		
1	Option 1: Evaluate all available RMs in the blending room (in Dilution form) and make a note of descriptors. Compare individual descriptors with Standard descriptors from Reference book (Fenaroli) or the good scents company site. Note down possible end uses for that particular aroma chemical in respective flavor/fragrance. Monthly Smelling test to be conducted by course co-ordinator or Visiting faculty.	30		
2	Option 2: Bring any Market product which is Flavored/Fragrant. (e.g. Fruits, Vegetables, RTS drinks, Soaps, Shampoos, Detergent, etc.) Product Profiling: Evaluate it as a Team/individual and note down the flavor/fragrance characters. List down minimum 5-7 (max 10) Chemicals that matches your product profiling based on your evaluation of the RMs in Option-1 Verify the results with respective Visiting faculties	30		
3	Option 3: Application of Flavors in different categories like Beverage, Confectionery, Bakery,	30		

	<p>Pharma by collaborating with FET &amp; Pharma departments.</p> <p>Evaluation of prototypes after 1-2 days of preparation of prototypes</p> <p>Conduct the shelf life study for prototypes</p> <p>After shelf life study, showcase prototypes to the course co-ordinator/visiting faculties with presentation (including Recipe, Dosage, Selection of Flavor, etc.)</p>	
4	<p>Option 4:</p> <p>Application of Fragrances in different categories like Fine Fragrance, Cosmetic Bases (Soap, Shampoo, Conditioner, Lotion, etc.) Home care product bases by collaborating with Oil &amp; Surfactant technology department.</p> <p>Evaluation of prototypes after 1-2 days of preparation of prototypes</p> <p>Showcase prototypes to the course co-ordinator/visiting faculties with presentation (including Base formulation, Fragrance Dosage, Selection of Fragrance, etc.)</p>	30
<p><b>List of Text Books/ Reference Books</b></p> <ol style="list-style-type: none"> <li>1 Perfume and flavor materials of natural origin - arctander</li> <li>2 Fragrance Chemistry – E. T. Theimer</li> <li>3 Perfumery and Flavoring synthetics – Bedaukian</li> <li>4 Common fragrance and flavor materials – Bauer</li> <li>5 Chemistry and Technology of Flavours and Fragrances-David Rowe, Wiley Publications</li> </ol> <p><b>Course Outcomes (students will be able to....)</b></p> <ol style="list-style-type: none"> <li>1 To understand the basic creation and blending of perfumes and flavors</li> <li>2 Application of formulations in the products</li> <li>3 Sensory testing and dosage understanding to prepare the stable formulation</li> </ol>		

## **PFP 2004 Research Project II**

### **Course Outcome:**

1. Systematically perform experiments/modeling activity to accomplish the set objectives
2. Critically analyse the results and present them in coherent manner in the form of graphs, tables etc.
3. Write a technically correct report as per the suggested guidelines and present the work

### **Details:**

This would be concerned with the continuation of the research project executed in the first semester and the exact work plan will be decided in consultation with the research guide. At the end of the project, the candidate is expected to submit a report as per similar guidelines provided for **PFP 2002** above which will be evaluated by the research guide and an external examiner from the Department/Industry based on the presentation made by the candidate. A suitable combination of the marks for report and presentation will be considered for the final evaluation.