Department of Chemistry

Revised Syllabus of III Year Diploma Program (UG)

Title of Program: Processing and packaging of household products
Year of Implementation: 2022-2023
Duration: One Year
Pattern: Semester
Medium of Instruction: English
Contact hours: 7 hours/week

Syllabus Structure (UG)

Year	Semester	Course No.	Course Code	Contact Hours	Credits (1Credit=15 H)	Total Marks
1	I	CT I	DCT 101	30	2	75
		CL I	DCL101	60	2	75
	II	CT II	DCT 202	30	2	75
		CL II	DCL202	60	2	75
	Annual	CP I	DCP101	30	1	50
	Total			**210**	**9**	**350**
2	III	CT III	DCT 303	30	2	75
		CL III	DC L303	60	2	75
	IV	CT IV	DCT 404	30	2	75
		CL IV	DC L404	60	2	75
	Annual	CP II	DCP202	30	1	50
	Industrial and or Incubation and or Research and or Field Training			30	1	-
	Total			**240**	**10**	**350**
3	V	CT V	DCT 505	30	2	75
		CLV	DCL505	60	2	75
	VI	CT VI	DCT 606	30	2	75
		CL VI	DCL606	60	2	75
	Annual	CP III	DCP303	60	2	100
	Industrial and or Incubation and or Research and or Field Training			30	1	-
	Total			**270**	**11**	**400**
Total				**720**	**30**	**1100**

Total No. of Courses: 15 (Theory: 6, Practical: 6, Project:3)

Theory and Practical: Semester, Project: Annual

CT: Course Theory, CL: Course Lab, CP: Course Project, D: Diploma, *: First Letter Name of Subject/Department

Semester V

CT V: DCT 505: Introduction and raw materials

(Contact Hrs: 30 Credits: 2)

Learning Objectives: Student

1. Understands the Art of perfumery
2. Understands the fundamentals, basic principles, concepts and recent developments in the subject area.
3. learns various raw materials and their properties which are essential for the formulation of some basic perfumes

Unit I: Introduction to perfumes (15)

Definitions:- Definitions of perfumes, Historical Background of perfumes :- Egyptian and Indian civilization, Classification of perfumes :- A) Perfumes obtained from plant sources. B) Perfumes obtained from animal sources c) Various terms used in perfumery. Chemical classification of perfumes

Unit II: Raw material of perfumes (15)

Essential Oils:- Introduction production study of various physical and chemical properties of essential oils, concentrate oils, absolute oils, essential oils derived from distillation, essential oils obtained by expression. Essences – Herbal and synthetic attors, cologne, & aromatic water, method of preparation small scale and large scale uses. Odour application:- Odour, its classification and fixation and various methods for odour appreciation.

Learning Outcomes:

After completion of the course, Students are able to

1. Prepare good quality of essential oils.
2. Identify best raw materials required in perfume-making
3. explain the fragrance families and classification

Reference Books:

1. Muller Peter, and Lamparsky Dietmar, Perfumes: art, science and technology. Springer Science, 1994
2. Theimer Ernst. Fragrance Chemistry: The Science of the Sense of Smell. New York: Academic Press, 2012

3. Danute Pajaujis Anonis. Flower Oils and Floral Compounds in Perfumery. Allured Co., 1993.
4. David Rowe. Chemistry and Technology of Flavors and Fragrances. Blackwell Publishing, 2004
5. Poucher, Perfumes, Cosmetics and Soaps: Volume I The Raw Materials of Perfumery:1. Springer; 2011.
6. Williams. The Chemistry of Essential Oils: An Introduction for Aromatherapists, Beauticians, Retailers and Students. Micelle Pr; 2nd edition, 2008.

CL-V: DCL505: Perfumes analysis

(Contact Hrs: 60 Credits: 02)

Learning Objectives:

Student

1. Understands the properties of essential oil/perfumes
2. learns the acid value, ester value, phenol and chlorine content in essential oil
3. studies the quality of the essential oil/ perfumes

List of Practical's

1. Preliminary examination of perfumery materials and samples
2. Methods of sampling and test for natural and synthetic perfumery materials; sampling
3. Determination of relative density of an essential oil
4. Determination of optical rotation of an essential oils
5. Determination of solubility
6. Determination of acid value
7. Determination of ester value, content of esters and alcohols
8. Determination of residue on evaporation
9. Determination of carbonyl value and content of carbonyl compounds.
10. Determination of phenols content in essential oil.
11. Detection of chlorine content in essential oil.
12. Determination of Water Content in essential oil by Karl Fischer Method

Any suitable experiments may be added

Learning Outcomes:

After completion of the unit, Student is able to

1. Analyze the properties of essential oil/perfumes

2. Calculate the amount of the constituents present in essential oil.
3. Find out the quality of the essential oil.

Reference Books:

1. Hüsnü Can Baser, and Gerhard Buchbauer. Handbook of essential oils science, technology, and applications. CRC Press, 2020.
2. Oprean, Tamas, Sandulescu, and Roman. Essential oil analysis. I. Evaluation of essential oil composition using both GC and MS fingerprints. Journal of Pharmaceutical and Biomedical Analysis, Vol 18, 4–5, (1998), 651-657.
3. Edris Amr. Pharmaceutical and therapeutic potentials of essential oils and their individual volatile constituents: a review, 21, 4, (2007), 308-23.
4. Sukhdev Handa, Suman Khanuja, Gennaro Longo, and DevDutt Rakesh. Extraction technologies for medicinal and aromatic plants.ICS UNIDO, 2008.
5. The Bureau of Indian Standards Act of 1986. Natural and Synthetic Fragrance Materials (PCD 18). https://law.resource.org/pub/in/bis/manifest.pcd.18.html

Semester VI

CT-VI: DCT 606: Perfumery

(Contact Hrs: 30 Credits: 2)

Learning Objectives: Student

1. Understands the analysis and standardization of perfumes
2. Studies Specifications of materials for essential oils
3. Learns the formulation process of perfume.
4. Understands the importance of packaging and marketing.

Unit I: Perfume Industry (15)

Historical background, present scenario &various equipments required for set up of perfume industry, study of safety & precautions to be taken in perfumery industries. Methods of perfumes preparation, Analysis and standardization of perfumes:- Includes analysis of essential oils and various physicochemical tests & parameters. Uses of perfumes:- 1) Aromatherapy and massage using perfumes 2) Use of perfumes in various cosmetics like skin cosmetics, hair cosmetics, men's toiletories. Safety:- Definition, safe use of perfumes, study of safety use of perfumes on naked skin including various dermatological tests.

Unit II: Packaging and marketing (15)

Importance of presentation, packaging in the past, the impact of aerosols on perfumes identity, perfume and world of fashion, market strategies, Indian standards of essential oils, standardizations of essential oils and materials specifications for essential oils.

Learning Outcomes:

After completion of the unit, Students are able to

1. Differentiate among the perfumes.
2. Describe the specification of raw materials
3. Develop the formulation process for preparation of perfumes
4. Design original and attractive packaging for perfume bottles.

Reference Books:

1. Handbook Of Essential Oils Science, Technology, And Applications H Edited by K. Hüsnü Can Baser and Gerhard Buchbauer
2. Perfume and materials of natural origin by Steffen Arctander
3. Chemistry and Technology of Flavours and Fragrances-David Rowe, Wiley Publications
4. Chemistry and Technology of Flavors and Fragrances Edited by David J. Rowe
5. Marketing management – Kotler
6. Marketing research – 1987, David Luck, Ronald S. Rubin

CL-VI: DCL 606: **Extraction and Preparation of perfume**

(Contact Hrs: 60 Credits: 02)

Learning Objectives: Student

1. Understands basics and production of essential oils
2. Learns the techniques for the extraction of essential oils
3. Learns separation, purification and isolation of aroma chemicals.

List of Practical's (15)

1. Extraction of essential oil from different flowers (Rose, Jasmine)
2. Extraction of essential oil from different flowers (Plumeria, Tuberose)
3. To prepare perfume from different flower essential oils.
4. Extraction of essential oil by steam distillation.

5. Extraction of essential oil by solvent extraction method.
6. Analysis of essential oil by using GC technique.
7. Analysis of essential oil by using HPLC technique.
8. To identify the different types of packaging materials.
9. To determine GSM (gram per square meter) of paper and paperboard.
10. To determine thickness of paper and paperboard.
11. To determine the thermal shock resistance of a glass container.
12. Preparation of labels according to package labelling laws.
13. Determination Tear resistance of different packaging materials.
14. Determination Tensile strength of different packaging materials.

Any suitable experiments may be added

Learning Outcomes:

After completion of the unit, Students are able to

1. Produce essential oils from different resources.
2. Apply suitable techniques for extraction of essential oils.
3. Concentrate pure aroma chemicals.

Reference Books:

1. Chemistry and Technology of Flavors and Fragrances Edited by David J. Rowe
2. Perfumes, Cosmetics and Soaps: Volume I The Raw Materials of Perfumery by W A Poucher revised by G M Howard
3. Handbook Of Essential Oils Science, Technology, And Applications H Edited by K. Hüsnü Can Baser and Gerhard Buchbauer
4. The chemistry of essential oils by D. G. Williams
5. "*The Encyclopedia of Chromatography"*, edited by Dr. Jack Cazes of Florida Atlantic University.
6. R. Oprean; M. Tamas; R. Sandulescu; L. Roman "*Essential oil analysis. I. Evaluation of essential oil composition using both GC and MS* " fingerprints. J. Pharm. Biomed.
7. "Edris AE., 2007, Pharmaceutical and therapeutic potentials of essential oils and their individual volatile constituents: a review, 21(4):308-23
8. Extraction technologies for medicinal and aromatic plants- by Sukhdev Swami Handa, Suman Preet Singh, Khanuja Gennaro Longo, Dev Dutt Rakesh
9. data.gov.in, standardsbis.in, public.resource.org

CP III: DCP303: Project

(Contact Hrs. 60, Credits: 2)

Industrial and or Incubation and or Research and or Field Training

(Contact Hrs. 30, Credits: 1)

BOS Sub-Committee

1. Dr. G. D. Kokate (Chairman)
2. Mr. A. D. Kadam (Member)

Expert Committee

1. Dr. K V. Gaikwad, Asst. Prof. R.C. Shahu College, Kolhapur (Academic Expert)
2. Mr. Sagar Deshpande (Industrial Expert) Altron Chemicals, Satara