Punyashlok Ahilyadevi Holkar Solapur University, Solapur.

NAAC Accredited - 2022'B++' Grade (CGPA 2.96)

Name of the Faculty: Science & Technology

(As per New Education Policy 2020)

CHOICE BASED CREDIT SYSTEM

Syllabus: Five Year Integrated M. Tech. in Cosmetic Technology

Name of the Course: Integrated M. Tech. in Cosmetic Technology Part II (Semester- III & IV)
(Syllabus to be implemented w. e. f. June 2025)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Syllabus of Five Year Integrated M. Tech. in Cosmetic Technology

(Choice Based Credit System)

Preamble:

In this course, there will be a clear study about the formulation, manufacturing, analysis of functional products. This area is mainly dependent on the subject of Pharmacy and Chemistry. The cosmetic technology course mainly revolves around industrial training and educational tours. This course includes studying raw materials, testing methods and laboratory procedures that are available worldwide.

Objective of the Course:

To formulate precise and effective cosmetic formulations by application of gained knowledge.
To apply new research and development in the field of cosmetics to reduce environmental impacts.
To study the subjects which will have the skills, knowledge and scientific temperament for career in the field of cosmetics.

Course Outcome:

Upon completion of programme students will have opportunities to work in cosmetic field related to research & development, marketing & academics of cosmetic as well as pharmaceutical industries.
Students will be able to formulate a research design and complete a substantial work of new products.
Students will be familiar with relevant governmental regulations which will help to confirm product compliance in domestic as well as international market.
Programme will provide self-employment opportunities.

Eligibility Criteria:

For Five Year Integrated M. Tech. in Cosmetic Technology following candidates are eligible.

1. Students with H.S.C. with Science Stream.
2. Students with B.Sc. (B group) subject: Chemistry, Zoology, Botany, Microbiology, Biotechnology, Biochemistry, Bioinformatics etc. are eligible for the direct admission to third year after successful completion of Orientation/ Induction program. Orientation/Induction program will be conducted by the School in SEM V of third year.
3. Students with D. Pharmacy are eligible for the direct admission to second year.
4. Students with B. Pharmacy are eligible for the direct admission to third year.
5. Students after completion of fourth year are eligible to award B. Tech. degree.

Title of the Course: Five Years Integrated M. Tech. in Cosmetic Technology
Fees for Course: As per university norms.
Strength of the Students: 30
Admission/Selection procedure: As per university norms.
Duration of the Course: 4+1 (Integrated)
Period of the Course: (from June to April each academic Year)
Teacher's qualifications: M. Pharm. / M. Tech. (Cosmetic Technology) / M. Sc. / PhD.
Standard of Passing: As per university norms.

Nature of question paper with scheme of marking:
Each theory paper will have 50 marks out of which 30 marks will be for term end examination (University Examination) and 20 marks for college assessment.
Each practical paper will have 25 marks out of which 15 marks will be for Term End examination and 10 marks for college Assessment.
The candidate has to appear for internal evaluation of 20 marks and external evaluation (University Examination) of 30 marks for each theory paper.
The candidate also has to appear for internal evaluation of 10 marks and external evaluation (University Examination) of 15 marks for each practical paper.
For VSC1 to VSC4, University assessment for 30 marks and college assessment for 20 marks.

I. **Nature of Theory question paper:**

Instructions
1) All Questions are compulsory
2) Figure to right indicate full marks

Q. No.1) Choose correct alternative. (MCQ) (6 Marks)

Q.No.2) Answer the following (Any Three) (6 Marks)
A)
B)
C)
D)
E)
Q.No.3) Answer the following. (Any Two) (6 Marks)
A)
B)
C)
Q. No.4) Answer the following (Any Two) (6 Marks)
A)
B)
C)
Q.No.5) Answer of the following (Any One) (6 Marks)
A)
B)

II) Nature of Practical question paper: Practical examination will be of 2 hours duration carrying 15 marks.

List of Laboratory Equipments Instruments, Measurements etc.: Potentiometer, Colorimeter, pH meter, conductometer, Microscope etc.

Rules and regulations and ordinance if any: NA

Medium of the language: English

Second Year structure as per NEP-2020

Level/ Difficulty	SEM	Faculty			Generic/ Open Elective GE/OE	Vocational & Skill Enhancement courses (SEC/VSC)	Ability Enhancement Course (AEC,IKS, VEC)	Field Project/RP/CC /Internship/Apprenticeship/Community engagement & services	Credits	Cumulative credits
		Major		Minor						
		DSC	DSE							
5.0/200	III	DSC 1-3 (2+1)	--	DSC 2-3 (2+1)	GE3/OE3 (2)	VSC1 (2) (DSC1) VSC2(2) (DSC2)	L2-1 (2)	CC2 (2)	22	44 UG Diploma (82)
		DSC 1-4 (2+1)	--	DSC 2-4 (2+1)						
	IV	DSC 1-5 (2+1)	--	DSC 2-5 (2+1)	GE4/OE4 (2)	VSC3 (2) (DSC1) VSC4(2) (DSC2)	L2-2 (2)	FP1/CEP1 (2)	22	
		DSC 1-6 (2+1)	--	DSC 2-6 (2+1)						

Exit option: Award of UG diploma in major with 88 credits and an additional 4 credits core NSQF course/ Internship OR continue with major.

Semester	Code	Title of the Paper	Semester Examination			L	T	P	Credits
			UA	CA	Total				
Sem-III		**Major**							
	DSC 1-3 (2+1)	Cosmetic Technology-III	30	20	50	2	--	--	2
	DSC 1-4 (2+1)	Cosmetic Chemistry-III (Analytical)	30	20	50	2	--	--	2
	DSC 1-3 Practical	Cosmetic Technology-III Practical	15	10	25	--	--	2	1
	DSC 1-4 Practical	Cosmetic Chemistry-III (Analytical) Practical	15	10	25	--	--	2	1
		Minor							
	DSC 2-3 (2+1)	Unit Operations- I	30	20	50	2	--	--	2
	DSC 2-4 (2+1)	Biomolecules -I	30	20	50	2	--	--	2
	DSC 2-3 Practical	Unit Operations – I Practical	15	10	25			2	1
	DSC 2-4 Practical	Biomolecules -I - Practical	15	10	25			2	1
		Generic/Open Elective							
	GE3/ OE3 (2)	Fundamentals of Skin Care	30	20	50	2	--	--	2
		Vocational / Skill Enhancement Course.							
	VSC1(2)	Skin Care Formulations (Practicals)	30	20	50	--	--	4	2
	VSC2(2)	Cosmetic Engineering (Practicals)	30	20	50	--	--	4	2
		Ability Enhancement Course (AEC)IKS, VEC							
	L2-1 (2)	**L2-1**	30	20	50	2	--	--	2
	CC2 (2)	**CC2 (Any one)** Field Project – I /Project (RP)-I /Co-curricular Courses (CC)/ Internship/Apprenticeship/ CommunityEngagement	30	20	50	--	--	4	2
	Total for Semester-III		330	220	550	12	--	20	22

Sem-IV		**Major**							
	DSC 1-5 (2+1)	Cosmetic Technology-IV	30	20	50	2	--	--	2
	DSC 1-6 (2+1)	Cosmetic Chemistry-IV (Instrumental Methods)- II	30	20	50	2	--	--	2
	DSC 1-5 Practical	Cosmetic Technology-IV Practical	15	10	25	--	--	2	1
	DSC 1-4 Practical	Cosmetic Chemistry-IV (Instrumental Methods)- II Practical	15	10	25	--	--	2	1
		Minor							
	DSC 2-5 (2+1)	Unit Operations- II	30	20	50	2	--	--	2
	DSC 2-6 (2+1)	Biomolecules -II	30	20	50	2	--	--	2
	DSC 2-5 Practical	Unit Operations – II Practical	15	10	25	--	--	2	1
	DSC 2-6 Practical	Biomolecules -II - Practical	15	10	25	--	--	2	1
		Generic/Open Elective							
	GE4/OE4 (2)	Fundamentals of Hair Care	30	20	50	2	--	--	2
		Vocational / Skill Enhancement Course.							
	VSC3(2)	Quantitative Chemical Analysis (Practicals)	30	20	50	--	--	4	2
	VSC4(2)	Experimental Approaches to Biomolecule analysis (Practicals)	30	20	50	--	--	4	2
		Ability Enhancement Course (AEC)IKS, VEC							
	L2-2 (2)	L2-2	30	20	50	2	--	--	2
	FP1/CEP1 (2)	FP1/CEP1 (2) **(Any one)** Field Project – II /Project (RP)-II/ Co-curricular Courses (CC)/ Internship/ Apprenticeship/ CommunityEngagement	30	20	50	--	--	4	2
		Total for semester IV	330	220	550	12	--	20	22

Second Year syllabus (according to the Semester Pattern Examination-CBCS)
w. e. f. Academic Year 2025-26

L=Lecture T=Tutorials P=Practical CA=College Assessment, UA = University Assessment

Code: DSC 1-3
Cosmetic Technology–III

Objectives of the Course:

Upon completion of this course students will be familiar with

1. The students will be familiar with specific actives used in cosmetic formulations, their technical aspects and evaluation methods.
2. Students will be familiar with chemistry involved in cosmetic formulations.
3. They will know common natural raw materials, especially the basic functional group involved, their physical and chemical properties and their applications.

Course Outcomes:

At the end of the course students will be

1. Able to formulate different kinds of skin cosmetics.
2. Able to select correct humectants and antioxidant for cosmetics.
3. Able to formulate bath preparation.

Unit-I **(05L/10M)**

Skin Creams: Introduction, classification of skin creams, cold cream cleansing creams, Night and massage cream, moisturizing cream, vanishing, foundation cream: Pigmented foundation cream, hand and body cream, all- purpose cream. Ingredients, manufacturing and packing of creams.

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Unit-II **(10L/15M)**

A) **Humectants**: Introduction, drying out, types, hygroscopicity, stability and safety of glycerin, sorbitol, propylene glycol, polyethylene glycol, butylene glycol, hyaluronic acid and urea, skin moisturization, Application of humectants.

B) Antioxidant: Introduction, Definitions: oxidation, free radicals, oxidative stress and antioxidant, free radical formation chain reaction, sources for generation of free radicals, mechanism of tissue damage by free radicals, ideal characteristics of antioxidants, types of antioxidants, functions of antioxidants antioxidant activity determination by invitro method: DPPH, Total phenol content, superoxide anion radical scavenging, hydrogen peroxide radical scavenging and nitric oxide radical scavenging, in-vivo method: Lipid peroxidation and reduced glutathiol, choice of antioxidants and Application of antioxidant.

Unit-III: **(05L/10M)**

Soaps: Introduction, cleansing action of soap, ingredients, types of soaps-bathing: toilet soaps, antibacterial soaps, liquid soaps, syndet (synthetic detergent bars) synthetic detergent: classification with the examples and their preparations, Manufacturing of soap: cold process, semi boiled process, full boiled or hot process, modern continuous hydrolysis and soap formation process, distinguish between soaps and detergents, evaluation and uses.

Unit-IV: **(10L/15M)**

Bath Preparation: Foam baths: Introduction, ingredients, types of products and their formulation, product assessment, Bath salts: Introduction, ingredients and formulations (preparation, colouring and perfuming).
Bath Oils: Introduction, ingredients, types of bath oils: floating or spreading oils, dispersible or blooming oils and soluble oils.

Books Recommended:

1. Harry's Cosmetology.
2. Cosmetic Science and Technology by Sagarin E

Code: DSC 1-3 (Practical)
Cosmetic Technology–III

Preparation of following formulations:

1. Cleansing Creams.
2. Cold Cream.
3. Vanishing Cream.
4. Emollient Cream.
5. Hand Cream
6. Bath Preparations – Bath oil and bath foam

Code: DSC 1-4
Cosmetic Chemistry-III (Analytical)

OBJECTIVE:

1. To study some basic concepts of Acid Base and complex forming reactions.
2. To understand the volumetric titration with example.
3. Some basic concepts of complexation and chelation.

OUTCOME: At the end of the course students will understand

1. Volumetric analysis
2. Titration curves
3. Complex forming reactions.

Unit-1: Electrochemistry **(5L/10M)**

Nernst equation, Calculation of std. Potential, Redox titrations, study of common oxidizing agents and reducing agents, Redox curves, ceric ammonium sulfate, Titanous chloride, 2,6-dichlorophenolindophenol titration, their theory and applications.

Unit-2: Volumetric Analysis: **(10L/15M)**

2.1 Introduction, Terminology: - Titrant, Titrand, Standard solution; Titration Indicator; Equivalence point; End point. Primary standard, Secondary standard. Strength of solution, volumetric analysis & their types.

2.2 Acid Base Titration i) Introduction ii) Theory of Acid-Base indicator: A) Colour change Interval B) Theories- Ostwald's theory & Quinoid theory, iii) Neutralization curve and choice of indicator for following titrations:

A) Strong acid and Strong Base
B) Strong Acid and Weak Base
C) Weak Acid and Strong Base

Unit-3: **(10L/15M)**

A. Physical processes: Filtration, Extraction, Sterilization and other physical treatments.

B. Complexometric titration-
Concepts of complexation and chelation, General account, Types of EDTA Titrations, Metallochromic Indicator w. r. t. Eriochrome Black-T, co-ordination number stability constant, titration curves, metal ion indicator, Masking and demasking agents, types of complexometric titration and its applications.

Unit-4: **(5L/10M)**

Determination & significance of acid value, saponification value, iodine value, ester value of an oil and fats used in cosmetic formulations.

Reference Books:

1. Text book of Practical Pharmaceutical Chemistry by Beckette and Stentake.
2. Quantitative Inorganic analysis by I. Vogel.
3. Cosmetic Chemistry -1 by Dr. Sheela Kulkarni.

Practicals

1. Determination of Acid value of oil and/or fats.
2. Determination of ester value of oil and/or fats.
3. Determination of saponification Value of oil and/or fats.
4. Determination of iodine value of oil and/or fats.
5. Experiment based on pH–Meter- pH determination of cosmetic raw material and products as per IP specification.
6. Experiment based on Conductometer- Determination of specific conductance/ conductivity of various electrolytes, standard graph, determination of concentration of electrolytes.

Code: DSC 2-3
Unit Operations – I

Learning Objectives: To make students to know
1) Various unit operations of Cosmetic industries.
2) Instruments and Machines used in Cosmetic manufacturing process.
3) Merits and demerits of different machines used in unit operations.
Learning Outcome: Students will be able to
1) Understand the working and theories behind various industrial processes.
2) Design and develop the solutions to analyze industrial unit operations.
3) Use of resources.

Unit-1: **(10L/15M)**
A) Flow of Fluids: Introduction to flow of fluids, Study of Different Manometers used in Industry, Reynolds experiment, Bernoulli's Theorem.
B) Measurement of fluid flow: Construction, working, uses of meters such as Orifice meters, Venturimeter, Pitot tube, Rotameter, displacement meter.
C) Transportation of fluids: Construction, working, uses of Pumps such as Reciprocating, Piston, Duplex diaphragm, rotary, centrifugal and turbine pumps.

Unit 2: **(10L/15M)**
A) Size Reduction: Mechanism of Size reduction, Classification of equipments. Study of Factors effecting selection of mills. Principles, construction, working, uses, merits and demerits of mills such as Hammer mill, Rotary cutter mill, Colloidal mill, Roller mill, Fluid energy mill.
B) Size Separation: Official standards for powders, Sieves, Modes of motion in size separation, Sieve analysis of powders. Principles, construction, working, uses, merits and demerits of Sieve shaker, cyclone separator.

Unit 3: **(05L/10M)**
Distillation: Theory, General equipments and Classification of Distillation Methods, Simple distillation, Flash distillation, Steam distillation, Distillation under reduced pressure.

Unit 4: **(05L/10M)**
Conveyer: Objective and advantages of conveyor. Principle, Construction, Working, Applications, Advantages and Disadvantages of Belt conveyor, Screw Conveyor, Pneumatic Conveyor, Chain Conveyor, Bucket Conveyor.

Reference Books:
1. Badger & Banchero : Introduction to chemical Engineering.
2. Mccabe & Smith : Unit operations in chemical Engineering.
3. Coulson and Richardson's & Vol. I & II : Chemical Engineering.
4. CVS Subrahmaniyam, J Thimma Shetty : Pharmaceutical Engineering, Principles and Practices.

Code: DSC 2-3
Unit Operations-I Practical

1) Practice in lettering construction & uses of plain diagonal, Vernier scales and scale of chords.
2) Projections of points, lines and planes.
3) Section of solids.
4) Steam distillation – To calculate the efficiency of steam distillation.
5) Particle size analysis.
6) Construction, working and application of Machinery such as Hammer mill, Rotary cutter mill, Colloidal mill, Roller mill, Fluid energy mill.

Code: DSC 2-4
Biomolecules-I

Learning Objectives:
To get students familiar with use of various bio-molecules in cosmetics.
To get to know about the chemistry and toxicity of mostly used inorganic substances in cosmetics.

Learning Outcomes:
Well acquainted with the interaction study of biomolecules and cosmetics.
Familiar with different classes of inorganic ingredients and their use in cosmetics.
Students can get to know about the natural silicates and their use in cosmetics.

Unit-1: **(05L/10M)**
Amino Acids: Essential and non-essential amino acids, ketogenic & glycogenic amino acids, Zwitterions. Physical & Chemical properties of amino acids with respect to their use in cosmetic preparations, Peptides, carrier peptides and their use in cosmetics. General application in skin care and cosmetics.

Unit -2: **(05L/10M)**
Proteins: Sources, classification in detail. Physical and Chemical properties and relation of these properties in use of proteins in cosmetic preparations. Growth factors in cosmetics, Importance of proteins in cosmetic and Pharmaceutical industries.

Unit -3: **(10L/15M)**
Enzymes: Definition, nomenclature & classification. Mechanism of enzyme action. Coenzymes & Prosthetic group. Properties of enzymes. Enzyme in cosmetic formulations. Types of enzymes in skin care and their benefits, their industrial uses with respect to cosmetic and pharmaceutical industries.

Unit –4: **(10L/15M)**
Clay minerals and the natural and synthetic silicates: Chemistry in brief of silicones. Properties, Natural silicates, synthetics, synthetics silicates. Their properties and uses in preparation of cosmetics and drugs. Toxicity of Silicones. Silk powder.
Synthetic Surfactants: Classification, commercial, commercial surfactants, cosmetic uses.
Insoluble Metallic soaps: Methods of manufacture and uses.

Reference Books:
1. Chemistry & Manufacture of Cosmetics by M. G. DeNavarre

Code: DSC 2-4
Biomolecule- I Practical

1. Qualitative test for proteins and amino acids.
2. Estimation of amino acids by Ninhydrin method.
3 Estimation of Ascorbic Acid (Vit.C)
4. Identification test and analysis of lanolin.
5. Identification test and analysis of kaolin.
6. Estimation of proteins by broadford method.

Code: Generic/Open Elective 3
Fundamentals of Skin Care

Learning Objectives:

- Introduction to sterilization and different face shape and eyebrow arching
- Introduction to basic skin treatments and methods of hair removal
- To learn about the various facial tools

Learning Outcomes:

At the end of the course students will be able to explain

- To perform basic skin care services including skin analysis, facials technique and superfluous hair removal.

Unit-1: Introduction to skin care and facial aesthetics (10L/15M)

Introduction and methods of sterilization and sanitation, physical agent, chemical agent and dry sanitizer overview of skin care and its importance, history of skin care across culture.

Identification of face shape and eyebrow arching: Implement materials and cosmetic used in eyebrow arching, different shapes of eyebrow according to face shape angular, straight, v shape thin, medium and thick.

Unit 2: Basic Skin Treatments (10L/15M)

Skin analysis, understanding and maintaining pH of the skin, Skin Care, CTM, beauty treatment, Bleaching, types of bleaching, Patch test, procedure for powder bleach, precautions for bleaching, Different type of masks and packs**,** applications of Masks

Home-made Basic preparations**:** Cleanser, creams, toner, astringent, pack, moisturizer, rose water, cleansing milk, scrub, ubtan, multani mitti, fruit, clay, ayurvedic

Unit 3: Removal of superfluous hair (05L/10M)

Tools and materials for removal of superfluous hair, methods of removal of superfluous hair, Epilation - Tweezing, Laser/Thermolysis/Electrolysis, Depilation - Depilatory Cream, Razor, contraindication, hygiene and safety precautions

Unit 4: Machines used for Facial Services (05L/10M)

Facial steamer, High-frequency, Galvanic, Ultrasonic, Vacuum suction, Microcurrent/Electro-muscle stimulator, Lymphatic drainage equipment, Microdermabrasion, Contraindications

Books recommended:

1. Beauty Therapy: The Foundation Level II, by Lorraine Nordmann
2. Professional Beauty Therapy Level III, by Lorraine Nordmann

Milady's Standard Cosmetology, by Milady

Vocational and Skill Enhancement Course.

Code: VSC1

Skin Care Formulations (Practicals)

(60 Hrs/50M)

Students have to perform below practicals

Learning Objectives: To make students to know

1) The basic components and their functions in foundation cream formulation, and the evaluation of the physicochemical properties of the foundation cream, such as pH, viscosity, and spreadability
2) The essential ingredients and their roles in toilet soap formulation, and the evaluation of the toilet soap's hardness, lathering properties, and cleansing efficiency.
3) The process of formulating a clear and stable transparent soap, and evaluate its transparency, hardness, and lathering properties.
4) The principles and importance of antioxidant activity in herbal extracts and learn various methods for determining the antioxidant activity of dried herbal extracts.

Learning Outcome: Students will be able to

1) Formulate different kinds of skin cosmetics.
2) Formulate bath preparations, toilet soap, liquid soap, antibacterial soap
3) Formulate a syndet bar with suitable pH and skin-friendly properties.
4) Determine Antioxidant Activity of Dried Herbal Extracts
5) Formulate a cream suitable for various skin types and uses

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List of Experiments:

1. Formulation and evaluation of Foundation cream
2. Formulation and evaluation of Massage cream
3. Formulation and evaluation of Liquid soap
4. Formulation and evaluation of Toilet soap
5. Formulation and evaluation of Anti-bacterial soap
6. Formulation and evaluation of Moisturizing cream
7. Formulation and evaluation of All-purpose cream
8. Formulation and evaluation of Transparent soap
9. Formulation and evaluation of Syndet bar
10. Determination of antioxidant activity of dried herbal extracts.

- **(*Other relevant practicals can be added.)**
- **Project report should be submitted on the applications of the VSC-all practicals in the formulation, evaluation and analysis of cosmetic products. This report will have 10 marks.**

Code: VSC2
Cosmetic Engineering (Practicals)

(60 Hrs/50M)

Students have to perform below practicals

Learning Objectives: To make students to know

1) Effects of various environmental conditions in cosmetic industry.
2) Different unit operations in cosmetic industry.
3) Working of different machines used in unit operations.
4) Different factors affecting the different unit operations in cosmetic industry.

Learning Outcome: Students will be able to

1) Determine the rate of heat transfer.
2) Handle the different unit operations in cosmetic industry.
3) Understand the mechanism of drying, transportation, size reduction, size separation.
4) Understand the constructions and working of various machines.
5) Understand the different factors affecting the different unit operations in cosmetic industry.

List of Experiments:

1. Determination of moisture content & loss on drying.
2. Construction, working & applications of machines such as Ball mill.
3. Determination of particle size distribution by sieving method.
4. Factors affecting rate of filtration.
5. Factors affecting rate of evaporation.
6. To study the effect of time on the rate of crystallization.
7. Demonstration of belt conveyor, pneumatic conveyor.
8. Construction of drying curves (calcium carbonate).
9. To calculate the rate of heat transfer in painted and unpainted glass using reduction mechanism.
10. To determine & report the rate of corrosion of given metal pieces.

- **(*Other relevant practicals can be added.)**
- **Project report should be submitted on the applications of the VSC-all practicals in the formulation, evaluation and analysis of cosmetic products. This report will have 10 marks.**

Ability Enhancement Course

Course Code: L2-1

BOS

Semester IV

Code - DSC 1-5

Cosmetic Technology–IV

Learning Objectives:

Upon completion of this course the students will be familiar with:

1. The students will be familiar with specific actives used in cosmetic formulations, their technical aspects and evaluation methods.
2. Students will be familiar with chemistry involved in cosmetic formulations.
3. They will know common natural raw materials, especially the basic functional group involved, their physical and chemical properties and their applications.

Learning Outcomes:

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course, are described:

1. Able to formulate different Productive creams and hand cleansers.
2. Able to select correct Skin Products for Babies.
3. Able to formulate Face packs and Masks.
4. Able to formulate coloured Make-up Preparations

Unit:1 **(08L/13M)**

a) Protective creams and hand cleansers: Introduction, barrier creams and formulation aspects; hand cleanser: Introduction and formulation aspects.

b) Skin lightener or bleaches: Introduction, skin bleaching/whitening agents used in skin lightener formulation: Hydroquinone, ascorbic acid, kojic acid, mercury compound and other agents. Skin lightning cream ingredients and their preparation.

Unit:2 **(06L/11M)**

Face packs and Masks: Introduction, distinguish between face pack and face mask, ingredients, introduction to clay-based systems, wax based systems, Rubber based systems, vinyl-based systems, and hydrocolloid-based systems along with their preparation.

Unit:3 **(06L/11M)**

Skin Products for Babies: Introduction, skin problems in babies, requirement of baby products, safety of baby products, introduction to types of baby products: Bath preparation, baby powder, baby soap, baby shampoo, baby cream and lotion, examples and formulations of baby products.

Unit:4 **(10L/15M)**

A) **Coloured Make-up Preparations:**

Lipstick- Introduction, ingredients of lipstick, Manufacturing of lipsticks, formulation and moulding defects in lipsticks, transparent lipstick, liquid lipsticks, lip salves.

Rouge: Introduction, Dry rouge- ingredients and manufacturing of dry rouge, cream rouge.

B) **Eye make-up:** Introduction, ingredients/raw materials.

Mascara: Definition, quality characteristics, introduction to cake mascara, cream mascara, liquid mascara.

Eye shadow: Definition, quality characteristics, introduction to Cream eye shadow, Stick eye shadow, Liquid eye shadow and Powder eye shadow and their manufacturing.

Eyeliner: Definition, quality characteristics, ingredients and preparation of liquid eye liner, cake eyeliner
Eyebrow pencil: Definition, quality characteristics and manufacturing of Eyebrow pencil.

Reference book

1. Harry's Cosmetology.
2. Cosmetic Science and Technology by SagarinE.

Paper code - DSC 1-5
Cosmetic Technology-IV - Practical

Preparation of following formulations:

1] Rouge: Powder rouge, cream rouge, liquid rouge
2] Lipstick
3] Deodorant preparations
4] Lotions: Cleansing and moisturizing
5] Eye shadow: Cream eye shadow and powder eye shadow.
6] Mascara : Cream mascara and liquid mascara
7] Skin lightening cream
8] Hand cleanser
9] Face pack
10] Face mask

Code - DSC 1-6

Cosmetic Chemistry-IV (Instrumental Methods)

Learning Objectives:

1. To study the different types of Instruments used for cosmetic product analysis.
2. To study the basic principles of Colorimetry and its classification.
3. To study the Conductometric acid-base titrations.
4. To study the Potentiometry and potentiometric titrations.

Learning Outcomes: After the end of the course, student can:

1. Understand the basic principles of Instruments used for cosmetic product analysis.
2. Be able to understand the Spectrophotometric titrations.
3. Easily understand the conductometric applications.
4. Be able to know principle of Potentiometer and its applications.

Unit-1: pH-metry **(5L/10M)**

pH measurement: Theory, Instrumentation, Construction, Working, Application and Advantages

Unit-2: Colorimetry **(5 L/10M)**

Introduction, General Discussion on theory of colorimetry, Lambert law & Beer's law (Derivation not expected), Terms used in Colorimetry, Application of Lambert law & Beer's law, Classification of methods of colour measurement or comparison, photoelectric photometer method - single cell photo-electric colorimeter.

Unit 3: Conductometry **(10 L/15M)**

Basic circuit of D.C., Wheatstone bridge, Measurement of conductance by Wheatstone bridge, Different types of conductivity cells, Experimental determination of specific, equivalent and molar conductance. Conductometric acid-base titrations, Advantages of conductometric titrations.

Unit 4: Potentiometry **(10L/15M)**

A. Introduction., Detail study of calomel, quinhydrone and glass electrodes, Basic circuit diagram of direct reading potentiometer.

B. Potentiometric titrations: Classical and analytical methods for locating endpoints

i) Acid – Base titrations. ii) Redox - titrations. iii) Precipitation titrations. Advantages of potentiometric titrations.

Reference Books:

1. Instrumental Methods of Analysis–Dean, Willar
2. Instrumental Methods of Analysis–Ewing.
3. Quantitative Inorganic Analysis–A. I. Vogel
4. Commercial Method of Analysis–Frank Biffen.

Code - DSC 1-6

Cosmetic Chemistry-IV (Instrumental Methods) Practicals

1) Determination of λ max., absorption curve of organic dyes/various extracts by Colorimeter.
2) Determination of concentration of organic dyes/various extracts by colorimeterically.
3) Determination of concentration of acids/bases by pH metric Titration method.

Code - DSC 2-5
Unit Operations-II

Learning Objectives: To make students to know
1) Various environmental conditions in cosmetic industry.
2) Different unit operations in cosmetic industry.
3) Working principles of different machines used in unit operations.

Learning Outcome: Students will be able to
1) Understand the concept of heat transfer.
2) Understand the mechanism of drying and mixing.
3) Understand the constructions and working of various machines.

Unit-1: **(05L/10M)**

Humidification and air conditioning: Various definitions related to humidification and air conditioning, wet bulb theory determination of Humidity, Humidifiers, and dehumidifiers.

Unit-2: **(10L/15M)**

A) Flow of heat: Classification of heat flow processes, Fourier's law, Heat flow through cylinder, convection. Natural Convection, forced convection surface coefficients.

B) Radiations: Black body, Emissivity, Heaters, Heat interchangers, Parallel and countercurrent Heat Exchangers, Finned tube heat changers.

Unit-3: **(05L/10M)**

Drying: Introduction, Theory of drying, Classification of drying equipments, Principle, Construction, Working, Advantages and Disadvantages of Tray dryer, Drum dryer, Spray dryer, Freeze dryer, Fluidized bed dryer.

Unit 4: **(10L/15M)**

Mixing:

A) Mixing of Solids -Interparticle interaction, Mixing Process, Factor influencing mixing, Classification of mixing equipment for solid mixing, Equipments.

B) Mixing of Liquids: Mechanism of Mixing, Mixing Vessel, Equipments.

Reference Books:

1. Badger & Banchero: Introduction to chemical Engineering.
2. Mccabe & Smith: Unit operations in chemical Engineering.
3. Coulson and Richardson's & Vol. I & II: Chemical Engineering.
4. CVS Subrahmaniyam, J Thimma Shetty: Pharmaceutical Engineering, Principles and Practices

Code – DSC 2-5
Unit Operations-II

Practical

1) Elementary ideas of Ist angle and IIIrd angle projectors. Top view, front view and sections.
2) Projections of simple solids such as cones, cylinders, prisms of pyramids with different positions and groundlines.
3) Isometric projections of simple solids.
4) Determination of humidity of air – i) from wet and dry bulb temperatures – use of Dew point method.
5) Determination of moisture content and loss on drying
6) Demonstration of colloid mill, planetary mixer, fluidized bed dryer and such other major equipment.

Code: DSC 2-6
Biomolecules-II

Learning Objectives: To get students familiar with
1. chemistry of various surfactants, lipids in cosmetics
1. To get to know about availability of natural viscosity modifier

Learning Objectives:
Well acquainted with the use of molecules such as lipids, humectants, polyols in cosmetics.
Students can get to know about pear farming.
Students can get to know about the importance of vitamins in cosmetic products.

Unit-1: Lipids: **(10L/15M)**
Sources, classification, structure of simple triglycerides. Waxes: classification, Composition, properties and importance of these properties in cosmetic formulations, uses.
Fatty acids: classification essential fatty acids, Production method, Production method, Properties and uses of fatty acids with respect to cosmetic and pharmaceutical establishments
Lanolin: composition, derivatives & uses. Derivatives of fatty acids: Their role in Cosmetics, Fatty Alcohols: Chemistry, types & uses in cosmetics.

Unit-2: **(05L/10M)**
Humectants and Polyols: Choice of humectants, unusual humectants, example of humectants, pecial uses of humectants. Lanolin: Source, composition, properties, derivatives &their uses in cosmetics.
Viscosity Modifiers – eg. gum, alcohol and electrolytes, solvents etc.

Unit-3: Vitamins: **(10L/15M)**
Definition, fat soluble and water soluble Vitamins, sources, structure, Physiological & Metabolic role of Vit. A, D, E & K Importance in cosmetics & Pharmaceuticals. Structure & Sources of water soluble vitamins, B Complex & Vit. C. Their role in Cosmetic industries.

(05L/10M)
Unit-4: Pearls and Pearl Essence: Definitions, commercial uses, production methods, synthetic pearly substances. Ion exchange resins and their cosmetic uses in case of purified water, Raw water, standards for water as per IP, BP, USP (with recent amendments)

Book Recommended: 1. Chemistry & Manufacture of Cosmetics by M. G. DeNavarre

Paper Code: DSC 2-6
Biomolecules - II Practical

1. Qualitative test for lipids.
2. Determination of Saponification value of fats.
3. Determination of Acid value of fats.
4. Determination of Iodine value of fats.
5. Identification test and analysis of lanolin.
6. Enzyme assay of amylase activity.

Code: Generic/Open elective 4
Fundamentals of Hair Care

Learning Objectives:

- To provide knowledge of draping techniques and artificial hair aids.
- To understand various hair treatments and their effects on different hair types.
- To learn about the safety, hygiene, and consultation processes involved in hair treatments.
- To understand various hair care tools and techniques.

Learning Outcomes:

At the end of the course students will be able to explain

- The knowledge of the structure of the hair, including the hair shaft, root, and follicle.
- The use of chemical hair care treatments such as coloring, highlighting, straightening, perming, and curling and identify the correct use of hair care tools

Unit 1: Draping techniques and artificial hair aids (10L/15M)

Introduction to draping, types of draping – wet hair services, dry hair services, chemical hair services, general electrical precautions

Use of artificial aids and switches: purpose of using a wig, types of wigs, storage and cleaning of wigs.

Unit 2: Hair care treatments (10L/15M)

Deep conditioning and hydration treatments, Hair spa treatments, Protein and keratin treatments, Hot oil treatments.

Chemical hair care treatments: Hair coloring and highlighting (temporary, semi-permanent, permanent) Hair straightening (relaxers, keratin treatments), perming and curling, chemical safety and client consultation.

Unit 3: Hair care tools and techniques (05L/10M)

Tools used in hair treatments (steamers, heat styling tools, micro-needling), correct usage and safety measures, techniques for blow drying, curling, and straightening.

Unit 4 Assisting in hair services (05L/10M)

Hair analysis, scalp massage, massage techniques, benefit for scalp massage, blow drying for wavy hair, roller setting, hair cutting, factors influencing hair cutting, hair cutting techniques, finishing techniques of hair cutting.

Books recommended:

1. Great Hair by Davis Biton
2. Milady's Standard Cosmetology
3. The science of Hair Care – John Wilkinson

VSC3

Quantitative Chemical Analysis (Practicals)

Objectives: -

1) To develop an in-depth understanding of preparing and standardizing chemical reagents.
2) Gain practical knowledge of using some instruments for accurate determination of chemical concentrations and physical properties of substances.
3) Integrate theoretical principles of volumetric and instrumental analysis with hands-on experiments.

Outcomes: -

1) Students will get Proficiency in Reagent Standardization.
2) Students will demonstrate the ability to determine concentrations of acids, bases, and mixtures using advanced analytical instruments.
3) Students will develop critical problem-solving abilities and analytical thinking to interpret data from experiments.

List of Experiments:

1. Preparation and standardization of Ceric Ammonium Sulphate, Assays Based on use of Arsenic trioxide, 8% NaOH, Dil. H_2SO_4 and Ferroin sulfate.
2. Preparation and standardization of Perchloric acid, Assay based on use of glacial acetic acid and acetic anhydride.
3. Preparation and standardization of Sodium EDTA. Assay based on EDTA.
4. Preparation and Standardization of Silver Nitrate, assay based on use of Sodium chloride.
5. Determination of concentration of individual acid/base from the mixture by pH metrically.
6. Determination of concentration of solutions by conductometrically.
7. Determination of concentration of individual acid/base from the mixture by conductometrically.
8. Determination of concentration of solutions by potentiometrically.
9. Determination of concentration of individual acid/base from the mixture by potentiometrically.
10. Study of refractometer- determination of refractive index of cosmetic ingredients / solvents as per IP specifications.
11. Experiment based on polarimeter- determination of optical rotation & specific optical rotation of optically active substances as per IP specifications.

- **(*Other relevant practicals can be added.)**
- **Project report should be submitted on the applications of the VSC-all practicals in the formulation, evaluation and analysis of cosmetic products. This report will have 10 marks.**

VSC4

Experimental Approaches to Biomolecule analysis (Practicals)

Students have to perform below Practicals

Learning Objectives: To make students to know

1. To verify its mineral composition, physical properties, and solubility.
2. Widely used in industries such as drilling, construction.
3. The analysis helps determine the quality, consistency and specific behavior.
4. To determine the purity of Amino acids.

Learning Outcomes: Students will be able to

1. Determining the presence and concentration of important elements.
2. Identification of purity and impurities of lipids.
3. Separation, visualization, purity assessment and identification of unknown amino acids.

List of Experiments:

1. Identification test and analysis of Bentonite.
2. Identification test and analysis of kaolin.
3. Estimation of iron in food stuff.
4. Separation of Amino acids by thin layer chromatography.
5. Quantitative estimation of Glycine by Sorenson's method.
6. Colorimetric estimation of proteins by Biuret/Lowry's method.
7. Qualitative and Quantitative analysis of sugars.
8. Separation of amino Acids by thin layer chromatography.
9. Determination of Iodine number of lipids.
10. Effect of pH change on proteins: precipitation of casein from milk.

- **(*Other relevant practicals can be added.)**
- **Project report should be submitted on the applications of the VSC-all practicals in the formulation, evaluation and analysis of cosmetic products. This report will have 10 marks.**

Ability Enhancement Course

Course Code: L2-2

BOS

FP1/CEP1
(2)

Students has to undergo the assigned Field Project-II/Project (RP)-II/ Co-curricular Courses (CC)/Internship/Apprenticeship/Community Engagement