

SOLAPUR UNIVERSITY, SOLAPUR.



SYLLABUS

FOR

**Five Year Integrated M. Tech. Course in Cosmetic
Technology**

(Semester I and II)

Choice Based Credit System (CBCS)

WITH EFFECT FROM ACADEMIC YEAR 2018-19

Punyashlok Ahilyadevi Holkar Solapur University, Solapur



Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

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

(Semester- III & IV)

(To be effective from the academic year June-2019-20)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

SCHOOL OF TECHNOLOGY

Syllabi of Five Year Integrated M. Tech. Course in Cosmetic Technology (Choice Based Credit System)

- 1) **Title of the course:** Integrated M. Tech. (Cosmetic Technology).
- 2) **Duration of course:** Five years.
- 3) **Pattern:** Semester and Credit system.
- 4) **Eligibility:** For Five Year Integrated M. Tech. Course in Cosmetic Technology following candidates are eligible.
-H.S.C. with Biology as one of the subjects.

5) **Strength of the Students:** 30

Five Year Integrated M. Tech. Course in Cosmetic Technology consists of 250 credits.

Five Year Integrated M. Tech. Course in Cosmetic Technology Course

Semester	No. of Papers/ Practicals / Seminar	Marks	Credits
Semester III			
• Theory Papers	05	500	20
• Practical Paper	02	200	08
• Seminar/Tutorial/Home Assignment /Field Tour/ Industrial Visit	01	25	01
Semester IV			
• Theory Papers	05	500	20
• Practical Paper	02	200	08
• Seminar/ Tutorial/Home Assignment /Field Tour/ Industrial Visit	01	25	01
Total marks and credits for Course		1450	58

Secoend Year syllabus (according to the Semester Pattern Examination) to be effective from the Academic Year 2019-20

Semester	Code	Title of the Paper	Semester Examination			L	T	P	Credits
			Theory	IA	Total				
Sem-III		Hard Core							
	HCT3.1	Cosmetic Technology I	70	30	100	4	--	--	4
	HCT3.2	Instrumental methods of Analysis - I	70	30	100	4	--	--	4
	HCT3.3	Cosmetic Engineering - I	70	30	100	4	--	--	4
	HCT3.4	Cosmetic Chemistry III	70	30	100	4	--	--	4
		Soft Core (Any one)							
	SCT3.1	Drug & Cosmetic Laws	70	30	100	4	--	--	4
	SCT3.2	Introductory Pharmacology and Toxicology	70	30	100	4	--	--	4
		Seminar/Tutorial/Industrial Visit/ Field Tour	---	25	25	--	1	--	1
	HCP1.1	Practical-I	70	30	100	--	--	06	4
	HCP1.1	Practical-II	70	30	100	--	--	06	4
	Total for Semester-III			490	235	725	--	--	--
Sem-IV		Hard Core							
	HCT4.1	Cosmetic Technology - II	70	30	100	4	--	--	4
	HCT4.2	Instrumental methods of Analysis - II	70	30	100	4	--	--	4
	HCT4.3	Cosmetic Engineering - II	70	30	100	4	--	--	4
	HCT4.4	Cosmetic Chemistry - IV	70	30	100	4	--	--	4
		Soft Core (Any one)							
	SCT4.1	Drug & Cosmetic Laws - II	70	30	100	4	--	--	4
	SCT4.2	Introductory Pharmacology and Toxicology	70	30	100	4	--	--	4
		Seminar/Tutorial/Industrial Visit/ Field Tour	---	25	25	--	1	--	1
	HCP4.1	Practical-III	70	30	100	--	--	06	4
	HCP4.2	Practical-IV	70	30	100	--	--	06	4
	Total for Semester-IV			490	235	725	--	--	--

L=Lecture Theory

T=Tutorials

P=Practical

IA=Internal Assessment ,HCT=Hard Core

SCT=Soft Core Theory,HCP=Hard Core Practical

Evaluation Scheme:

Each theory paper will have 100 marks out of which 70 marks will be for Term End examination and 30 marks for Internal Assessment. Each practical paper will have 50 marks out of which 35 marks will be for Term End examination and 15 marks for Internal Assessment. The candidate has to appear for internal evaluation of 30 marks and external evaluation (University Examination) of 70 marks for each **theory** paper. The candidate also has to appear for internal evaluation of 15 marks and external evaluation (University Examination) of 35 marks for each **practical** paper.

Internal Evaluation:

- In case of theory papers internal examinations will be conducted by school.
- In case of practical paper 05 marks shall be for day-to-day journal and internal examination of 10 marks will be conducted by the school.

External Evaluation (End of Term University Examination):

I) Nature of Theory question paper:

- Q.1 Multiple Choice Questions 14
- Q.2 A) Answer the following (Any Four) 08
 - 1. 02
 - 2. 02
 - 3. 02
 - 4. 02
 - 5. 02
- B) Write Notes on (Any Two) 06
 - 1. 03
 - 2. 03
 - 3. 03
- Q.3 A) Answer the following (Any two) 08
 - 1. 04
 - 2. 04
 - 3. 04
- B) Answer the following (Any One) 06
 - 1. 06
 - 2. 06
- Q.4 A) Answer the following (Any Two) 10
 - 1. 05
 - 2. 05
 - 3. 05
- B) Answer the following (Any One) 04
 - 1. 04
 - 2. 04
- Q.5 Answer the following (Any two) 14
 - 1. 07
 - 2. 07
 - 3. 07

II) Nature of Practical Question paper: Practical examination will be of 6 hours duration carrying 60 marks. VIVA & record book will be for 05 marks each.

Paper No. I

Paper Code: HCT3.1

COSMETIC TECHNOLOGY– I

Unit-1: Physical & Chemical properties of agents (Drug & Cosmetics) influencing design of products forms. **(15 L)**

Unit-2: Monophasic liquid formulations, techniques of enhancing solubilities of ingredients in vehicles, other problems involved in preparation and stability of liquid with special emphasis on spray. **(15 L)**

Unit-3: Surface active agents – definition classification based on chemical nature and HLB scale, properties and significance in cosmetics **(15 L)**

Unit-4: Packaging and dispensing of cosmetic formulations: Importance of different materials for containers and closures. Packaging of cosmetic product and labeling. Environmental aspects of packaging materials, appropriate recycling and disposal. Green packaging. Hydrocolloids – definition classification, properties and significance in cosmetics **(15 L)**

Reference Books:

1. Mithal Text Book of Pharm formulations B 11, Pilani.
2. The Pharmacopoeia of India
3. Remingtons Pharmaceutical Practices.
4. Cooper & Gum Dispensing for Pharmaceutical Students.
5. Husa: Pharmaceutical Dispensing: mach Publishing Co.
6. Text Book of Cosmeticology – by Harry's

Paper No. II

Paper Code: HCT3.2

INSTRUMENTAL METHODS OF ANALYSIS - I

Unit-1: Introduction to Instruments used for cosmetic analysis, Classification of instrumental Methods.

Spectroscopy: introduction to spectroscopy, electromagnetic radiation- its properties and spectrum. **(15 L)**

Unit-2: Colorimetric, UV and Visible spectroscopy - Basic Principles, essential parts of spectrophotometers, uses and application of spectrophotometer. Spectrophotometric titration. **(15 L)**

Unit-3: Flame photometry- Introduction, General principles, Instrumentations and applications **(15 L)**

Unit-4: Chromatography- Introduction and classification in General Principles, type – columns, paper and thin layer chromatography and their applications. **(15 L)**

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 – Shall be Biffer.

Paper No. III

Paper Code: HCT3.3

COSMETIC ENGINEERING - I

Unit-1: Flow of Fluids: Fluid statics, manometers, Reynolds No. Bernoulli's Theorem, fluid heads, frictional losses. (15 L)

Unit-2: Measurement of fluid flow meters. Orifice meters, Venturimeter, Pitot tube, Rotameter, displacement meter. (15 L)

Unit-3: Transportation of fluids: Pipes, pipe joints.

Pumps: various types of pumps: reciprocating, Piston, Duplex diaphragm, rotary, centrifugal and turbine pumps. (15 L)

Unit-4: Conveying : Belt, Apron, Bucket, Screw & pneumatic. (15 L)

Reference Books:

1. Bodger & Banchemo : Introduction to chemical Engineering.
2. McCabe & Smith : Unit operations in chemical Engineering.
3. Richardson & Couplson Vol. I & II : Chemical Engineering.
4. Hougen & Watson : Material & Energy Balances Part – I

Paper No. IV
Paper Code: HCT3.4
COSMETIC CHEMISTRY - III

Unit-1:Amino Acids:

Classification, essential and non-essential amino acids, ketogenic & glycolytic amino acids, Zwitterions. Physical & Chemical properties of amino acids with respect to their use in cosmetic preparations. Their wide applications in cosmetics. **15 L**

Unit - 2 Proteins:

Sources, classification in detail, Physical and Chemical properties and relation of these properties in use of proteins in cosmetic preparations. Importance of proteins in cosmetic and Pharmaceutical industries. **15 L**

Unit - 3 Enzymes:

Definition, nomenclature & classification. Mechanism of enzyme action. Coenzymes & Prosthetic group. Properties of enzymes. Their industrial uses with respect to cosmetic and pharmaceutical industries. **15L**

Unit - 4 Clay minerals and the natural and synthetic silicates: Chemistry in brief of silicones. Properties, Natural silicates, synthetic silicates. Their properties and uses in preparation of cosmetics and drugs. Toxicity of Silicones. Silk powder.

I) Synthetic Surfactants :

Classification, commercial, commercial surfactants, cosmetic uses. 3 periods

II) Insoluble Metallic soaps:

Methods of manufacture and uses. **15 L**

Book Recommended:

1. Chemistry & Manufacture of Cosmetics by M. G. DeNavarre

Paper No. V
Paper Code: SCT3.1

DRUG AND COSMETIC LAWS - I

Unit-1: Drugs & Cosmetic Acts and Rules (with reference to cosmetics). **(15 L)**

Unit-2: Drugs and Magic Remedies Act. Objectionable Advertisements. Prevention of Cruelty to Animal Act. **(15 L)**

Unit-3: The Medicinal and Toilet preparations (Excise duties) Acts and Rules. **(15 L)**

Unit-4: Schedule S & schedule Q of D & C act. Schedule M (ii) of Drug and Cosmetic Act with G.M.P. **(15L)**

Reference Books

1. Drugs & Cosmetic Acts & Rules. Govt. of India Publication.
2. T.B. of Forensic pharmacy by M. Mittal
3. IP, BP, NF, USP.

Paper No. V
Paper Code: SCT3.2

INTRODUCTORY PHARMACOLOGY & TOXICOLOGY - I

Unit-1: Scope of Pharmacology in Cosmetics, Terminologies and Definitions Routes of Administration of drug, giving special emphasis on Topical route, their advantages and disadvantages. **(15 L)**

Unit-2: Various processes of absorption of drug and the factors affecting absorption. Disposition of drug. **(15 L)**

Unit-3: General mechanism of drug action, site of drug action, type of drug action. **(15 L)**

Unit-4: Material safety data sheet (MSDS) its scope, significance during cosmetic material handling with examples. **(15L)**

Reference Books

1. Pharmacology and Pharmacotherapeutics By R.S. Satoskar and S. Bhandarkar
2. Essentials of Pharmacotherapeutics By F.S.K. Barar.

Practical Paper-I
Paper Code: HCP 3.1
PRACTICAL –I

Cosmetic Technology

- 1] Monophasic preparations like toners, mouthwash, astringents.
- 2] a) Wet gum method by using fixed and mineral oils.
b) Dry gum method by using fixed and mineral oils.
- 3] Preparation of o/w emulsions eg. Vanishing cream and all purpose cream
- 4] Preparation of w/o emulsion eg. Cold cream
- 5] Identification of types of emulsions.
- 6] Preparation of suspension eg. calamine lotion, rouge, foundation ets.

Instrumental Methods of Analysis.

- 1] Determination of $\lambda - \text{max.}$, absorption curve of organic dyes by Colorimeter.
- 2] Determination of concentration of organic dyes by Colorimeter and spectrophotometer.
- 3] Basic Experiment based on chromatography ie paper chromatography, thin layer chromatography and column chromatography

Practical Paper-II
Paper Code: HCP 3.2
PRACTICAL –II

Cosmetic Engineering

- 1] Use on Instruments, 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.

Cosmetic Chemistry

- 1] Qualitative test for proteins and amino acids.
- 2] Precipitation of proteins.
- 3] Effect of Ph change on proteins: Precipitation of casein from milk.
- 4] Quantitative estimation of glycine by Sorenson's method.
- 5] Colorimetric estimation of proteins by Biuret/ Lowry's method.
- 6] Enzyme assay. Assay of amylase activity.

Beauty Culture

1. Eye Brows:
 - i) Factors affecting eye brow shaping.
 - ii) Determination of correct length of eye brow.
2. Different methods for eyebrow shaping:
 - i) Threading.
 - ii) Tweezing
3. Treatment for superfluous hair waxing.
 - a. Hot wax treatment
 - b. Cold wax treatment
- i) Leg waxing
- ii) Hand waxing
- iii) Under arm waxing.
4. Bleaching :
 - i) Preparation of paste.
 - ii) Patch test
 - iii) Face bleaching
 - iv) Hand bleaching
 - v) Leg bleaching
 - vi) Precautions.

Books recommended:

1. Ann Eaton and Flurence Openshaw, Cosmetic Make – Up and Manicure.

Paper No. VI
Paper Code: HCT 4.1

COSMETIC TECHNOLOGY – II

Unit-1: Bisphasic liquid formulations: Emulsions & Suspensions. Emulsions – types, identification of emulsions, preparation, Suspensions – Flocculated and non-flocculated suspensions, selection of wetting suspending and dispensing agents, preparation and stability. **(15 L)**

Unit-2: Preservatives- origin of contamination, factors influencing the effectiveness of preservatives, Ideal characters, uses and safety aspects
(15 L)

Unit-3: Semisolid formulations:
Ointments, paste, creams, jellies, sticks, selection of ideal bases, preparation and stability and packing. **(15 L)**

Unit-4: Solid formulations - Bulk powders, incorporation of different varieties of powders viz. dusting, compact, face and talcum. Incompatibility – physical and chemical **(15 L)**

Reference Books:

1. Mithal Text Book of Pharm formulations B 11, Pilani.
2. The Pharmacopoeia of India
3. Remingtons Pharmaceutical Practices.
4. Cooper & Gun's Dispensing for Pharmaceutical Students.
5. Husa: Pharmaceutical Dispensing: mach Publishing Co.
6. Text Book of Cosmeticology – by Harry's.

INSTRUMENTAL METHODS OF ANALYSIS II

Unit-1: Raman Spectroscopy.- Introduction, principle, Instrumentation, applications
Polarimetry:- Introduction, optical activity, General Principles, apparatus, application in the determination of optical rotation and specific optical rotation of liquid and solid substances. **(15 L)**

Unit-2: pH measurement: by pH indicators and by Potentiometric method (pH meter)
Its Instrumentation and applications.**(15 L)**

Unit-3: Refractometry – Introduction to refractive index, theory and principle of Abbe's Refractometer, its application **(15 L)**

Unit-4: Conductometry:- Introduction, laws and definition of conductance, specific conductance, equivalent conductance, molecular conductance. Principles, instrumentation and applications.**(15 L)**

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 – Shall be Biffer.

Paper No. VIII
Paper Code: HCT4.3

COSMETIC ENGINEERING II

Unit-1: Humidification and air conditioning: Definitions, Humidity charts and uses, wet bulb theory, determination of Humidity, Humidifiers and dehumidifiers. **(15 L)**

Unit-2: Flow of heat: Classification of heat flow processes, Fourier's law, Heat flow through cylinder, convection. Natural Convection, forced convection surface coefficients, overall heat transfer through boiling liquids and condensing vapours **(15 L)**

Unit-3: Radiations, Black body, Emissivity,ometry, Heaters, Heat interchangers, Parallel and countercurrent Heat Exchangers, Finned tube heat changers. **(15 L)**

Unit-4: Fundamental concepts of material & energy balances: Units & Dimensions, dimensional analysis, material & energy balances for operations without chemical reactions. **(15 L)**

Reference Books:

1. Bedger & Banchemo : Introduction to chemical Engineering.
2. McCabe & Smith : Unit operations in chemical Engineering.
3. Richardson & Coullson Vol. I & II : Chemical Engineering.
4. Hougen & Watson : Material & Energy Balances Part – I

Paper No. IX
Paper Code: HCT 4.4
COSMETIC CHEMISTRY – IV

Unit-1: Lipids : 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 offatty 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.(15 L)

Unit-2: I) Humectants and Polyols :Choice of humectant, unusual humectants, special uses of humectants.Lanolin :Source,composition, properties, derivatives & uses.II) Viscosity Modifiers – eg, gum, alcohol and electrolytes, solvents etc.
(15 L)

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

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 wateras per IP, BP, USP (with recent amendments) (15 L)

Reference Books:

1. Chemistry & Manufacture of Cosmetics by M. G. DeNavarre

Paper No. X

Paper Code: SCT 4.1

DRUG & COSMETIC LAWS - II

Unit-1: Pharmacy Act..(15 L)

Unit-2: Factory Act.,Contract Act. (15 L)

Unit-3:Shop & Establishment Act. Sales Promotion Act.(15 L)

Unit-4: Standards of weight and measures Act (with reference to cosmetics) Patenting
in India & Abroad.(15 L)

Recommended Books:

1. Drugs & Cosmetic Acts & Rules. Govt. of India Publication.
2. T.B. of Forensic pharmacy by M. Mittal
3. IP, BP, NF, USP.

INTRODUCTORY PHARMACOLOGY & TOXICOLOGY - II

Unit-1: Pharmacology of Topical drugs, Introduction. Types of Topical drugs:

- a. Protective absorbents
- b. Demulcents
- c. Emollients
- d. Astringents and antiperspirants-deodarant
- e. Irritants, Rubefaciens and Vesicants.
- f. Sclerosing Agents.
- g. Caustics and Escharotics
- h. Keratolytics (Desquamating Agents)
- i. Cleansing preparations.
- j. Miscellaneous Dermatologics- mouth washes, gargals, sunscreens, melanizers& demelanizers. **(15 L)**

Unit-2: Miscellaneous Topical Drugs – Local antinfective agents- classification, properties, method of estimation of potency and mechanism of action of antibacterial agent, antifungal agent, ectoparasiticides **(15 L)**

Unit-3: Pharmacology of Cosmeceuticals used for Antiaging, Antiwrinkle, Fairness-bleaching& Sunscreens, Antidandruff, Anti inflammatory, Anti acne/pimple, Pigmentation etc. Autocoids: histamine, its pharmacological role and antihistamines. **(15 L)**

Unit-4: Heavy metals and metal antagonist: Symptoms and management of mercury, Arsenic, & lead poisoning. **(15 L)**

Reference Books:

1. Pharmacology and Pharmacotherapeutics By R.S. Satoskar and S. Bhandarkar
2. Essentials of pharmacotherapeutics By F.S.K. Barar.

Practical Paper-III

Paper Code: HCP4.1

PRACTICAL-III

Cosmetic Technology

Stability study of suspension – by use of thickening agents, flocculation agents.

2] Preparation of ointment bases – i) hydrocarbon ii) Absorbable iii) Water Soluble

iv) Water miscible.

3] Preparation of paste & jelly bases.

4] Preparation of simple stick bases.

5] Preparation of face powders

Instrumental Methods of Analysis.

1] Experiment based on pH – Meter, pH determination of cosmetic raw material and products as per IP specification

2] Experiment based on Conductometer, determination of specific conductance/ conductivity of various electrolytes, standard graph, determination of concentration of electrolytes.

3] Study of refractometer, determination of refractive index of cosmetic ingredients as per IP specifications.

4] Experiment based on polarimeter, determination of optical rotation of specific optical rotation of optically active substances as per IP specifications.

Practical Paper-IV

Paper Code: HCP4.2

PRACTICAL-IV

Cosmetic Engineering

- 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 ground lines.
- 3] Isometric projections of simple solids.

Cosmetic Chemistry

- 1] Qualitative test for lipids.
- 2] Determination of Saponification value of fats.
- 3] Determination of Acid value of fats.
- 4] Determination of Iodin number of fats.
- 5] Estimation of Ascorbic Acid (Vit. C)
- 6] Identification test and analysis of lanolin.
- 7] Identification test and analysis of Kaolin.
- 8] Identification test and analysis of Bentonite.
- 9] Analysis of water as per IP, BP and USP.

Beauty Culture

1. Manicure:
 - a. Requirement for manicure
 - b. Procedure
 - c. Nail shaping
 - d. Cuticle removing
 - e. Hand Massage.
 - f. Application of varnish
 - g. Nail extenders and Nail decoration
2. Pedicure:
 - a. Requirement for Pedicure

SOLAPUR UNIVERSITY, SOLAPUR**SCHOOL OF TECHNOLOGY****Syllabi of Five Year Integrated M. Tech. Course in Cosmetic Technology
(Choice Based Credit System)**

- 1) **Title of the course:** Integrated M. Tech. (Cosmetic Technology).
- 2) **Duration of course:** Five years.
- 3) **Pattern:** Semester and Credit system.
- 4) **Eligibility:** For Five Year Integrated M. Tech. Course in Cosmetic Technology following candidates are eligible.
 - H.S.C. with Biology as one of the subjects.

5) Strength of the Students: 30

Five Year Integrated M. Tech. Course in Cosmetic Technology consists of 250 credits.

Five Year Integrated M. Tech. Course in Cosmetic Technology Course

Semester	No. of Papers/ Practicals / Seminar	Marks	Credits
Semester I			
• Theory Papers	05	500	20
• Practical Paper	02	100	04
• Seminar/Tutorial/Home Assignment /Field Tour/ Industrial Visit	01	25	01
Semester II			
• Theory Papers	05	500	20
• Practical Paper	02	100	04
• Seminar/ Tutorial/Home Assignment /Field Tour/ Industrial Visit	01	25	01
Total marks and credits for Course		1250	50

First Year syllabus (according to the Semester Pattern Examination) to be effective from the Academic Year 2018-19

Semester	Code	Title of the Paper	Semester Examination			L	T	P	Credits
			Theory	IA	Total				
Sem-I		Hard Core							
	HCT1.1	Cosmetic Chemistry - I	70	30	100	4	--	--	4
	HCT1.2	Anatomy & Physiology - I	70	30	100	4	--	--	4
	HCT1.3	Fundamental Chemistry -I	70	30	100	4	--	--	4
	HCT1.4	Natural Cosmetic Agents-I	70	30	100	4	--	--	4
		Soft Core (Any one)							
	SCT1.1	Elementary Mathematics	70	30	100	4	--	--	4
	SCT1.2	Elementary Statistics	70	30	100	4	--	--	4
		Seminar/Tutorial/ Industrial Visit/ Field Tour	---	25	25	--	1	--	1
	HCP1.1	Practical-I	35	15	50	--	--	06	2
	HCP1.1	Practical-II	35	15	50	--	--	06	2
		Total for Semester-I	420	205	625	--	--	--	25
Sem-II		Hard Core							
	HCT2.1	Cosmetic Chemistry - II	70	30	100	4	--	--	4
	HCT2.2	Anatomy & Physiology - II	70	30	100	4	--	--	4
	HCT2.3	Fundamental Chemistry -II	70	30	100	4	--	--	4
	HCT2.4	Natural Cosmetic Agents - II	70	30	100	4	--	--	4
		Soft Core (Any one)							
	SCT2.1	English Communication Skills	70	30	100	4	--	--	4
	SCT2.2	Analytical Chemistry	70	30	100	4	--	--	4
		Seminar/Tutorial/ Industrial Visit/ Field Tour	---	25	25	--	1	--	1
	HCP2.1	Practical-III	35	15	50	--	--	06	2
	HCP2.2	Practical-IV	35	15	50	--	--	06	2
		Total for Semester-II	420	205	625	--	--	--	25

L=Lecture T=Tutorials

HCT=Hard Core Theory

HCP=Hard Core Practical

P=Practical IA=Internal Assessment

SCT=Soft Core Theory

Evaluation Scheme:

Each theory paper will have 100 marks out of which 70 marks will be for Term End examination and 30 marks for Internal Assessment. Each practical paper will have 50 marks out of which 35 marks will be for Term End examination and 15 marks for Internal Assessment. The candidate has to appear for internal evaluation of 30 marks and external evaluation (University Examination) of 70 marks for each **theory** paper. The candidate also has to appear for internal evaluation of 15 marks and external evaluation (University Examination) of 35 marks for each **practical** paper.

Internal Evaluation:

- In case of theory papers internal examinations will be conducted by school.
- In case of practical paper 05 marks shall be for day-to-day journal and internal examination of 10 marks will be conducted by the school.

External Evaluation (End of Term University Examination):**I) Nature of Theory question paper:**

- Q.1 Multiple Choice Questions 14
- Q.2 A) Answer the following (Any Four) 08
1. 02
 2. 02
 3. 02
 4. 02
 5. 02
- B) Write Notes on (Any Two) 06
1. 03
 2. 03
 3. 03
- Q.3 A) Answer the following (Any two) 08
1. 04
 2. 04
 3. 04
- B) Answer the following (Any One) 06
1. 06
 2. 06
- Q.4 A) Answer the following (Any Two) 10
1. 05
 2. 05
 3. 05
- B) Answer the following (Any One) 04
1. 04
 2. 04
- Q.5 Answer the following (Any two) 14
1. 07
 2. 07
 3. 07

II) Nature of Practical Question paper: Practical examination will be of 3 hours duration carrying 35 marks. There shall be 5 questions each of 10 marks, of which student has to attempt any 3 questions. VIVA will be for 05 marks.

Paper No. I
Paper Code: HCT1.1

COSMETIC CHEMISTRY – I

Unit-1: Sources of impurities and their control in Cosmetic raw materials. Limit tests, limit test of chlorides, sulfates, lead, arsenic and heavy metals. (15 L)

Unit-2: Acid base theory, concept of pH, Buffer solutions, Acid Base titrations, Standard solutions, Acid base Indicators, Theory of Acid base titration curves. (15 L)

Unit-3: Non-aq. titration of weak acid and weak bases – indicators uses and application. (15 L)

Unit-4: Theoretical basis of qualitative inorganic analysis. (15 L)

Reference Books:

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

Paper No. III**Paper Code: HCT1.3****FUNDAMENTAL CHEMISTRY -I**

Unit-1: Hydrocarbons (Saturated) Alkanes, Tetrahedral nature of carbon, SP³ hybridisation, isomerism, liquid paraffin, hard paraffin, preparation and reaction of cycloalkanes. Hydrocarbon (Unsaturated) Alkenes SP² Hybridisation, Markonikoff Rules, Cis-trans Isomerism, Dienes: preparation properties chemical reaction classification of dienes Alkynes SP – hybridization, preparation, properties, reactions of acetylene. (15 L)

Unit-2: Estimation and Quantitative Analysis : Estimation of elements and their principals, Determination of equivalent weight of acids and bases. Determination of empirical and molecular formula of acids and bases.

Ethers- Definition, preparation, properties and reaction of ethers, diethyl ether, an aesthetic ether, thioether and vinyl ethers. Aldehyde & Ketones- Definition and nomenclature, preparation, properties and chemical reaction of aldehyde and ketones. Carboxylic Acid – classification, structure, preparation and chemical reaction of monocharboxylic acid. Optical isomerism. (15 L)

Unit-3: Physical Properties and properties of liquids molecules.

i) Surface tension ii) Viscosity iii) Intermolecular forces and its impact on states of matter, physical properties and chemical constitution, parachor, dipole moment. (15 L)

Unit-4: Osmotic pressure, osmosis, semi – permeable membrane, osmotic pressure measurement, laws of osmotic pressure Molecular wt. Calculations. (15 L)

Reference Books:

1. Text Book of Organic Chemistry by Morrison and Boyd.
2. L.M. Atherdon, Bentley and Driver's Text Books of Pharmaceutical Chemistry. Oxford University Press, London.
3. Text book of Organic Chemistry by Bahl & Bahl.
4. A.N. Martin – Physical Pharmacy
5. Glasstone – Elements of Physical Chemistry
6. A. J. Med – Physical Chemistry
7. Vogel- Quantitative Inorganic Analysis.
8. Bahl and Tuli : Essentials of Physical Chemistry

Paper No. IV
Paper Code: HCT1.4
NATURAL COSMETIC AGENTS – I

Unit-1: History, development and role of natural product in cosmetic & medicine.

Different systems of classification of drugs of natural origin their merits & demerits (15 L)

Unit-2: Herbs description and morphology of organized and unorganized herbs.

Organized herbs root, stem, leaf and fruit and seed. Unorganized herbs – mucilage, latex and extracts. (15 L)

Unit-3: Carbohydrate- Definition, classification and general identification tests.

study of following carbohydrates used in cosmetics with respect to their source, chemical constituents and uses-i) Starches – Wheat, maize, rice, potato ii) Gums- Acacia, gaur-gum. pectin, agar, and cellulose (15 L)

Unit-4: Lipids-

- a) Definition, classification and general identification tests.
- b) i) oils – castor, linseed, olive, sesame, coconut, arachise oil
ii) fat and waxes – kokum butter, lanoline, beeswax, spermaceti, carnauba wax, candellila wax, shea butter.space. (15 L)

Reference Books:

1. Text book of Pharmacognosy – Trease and Evan's
2. Pharmacognosy – By Claus and Tayler.
3. Text Book of Pharmacognosy – T. E. Wallis.
4. Materia Medica – By Nadkarni.
5. Wealth of India – CSIR
6. Indian medical plants: by Kirtikar & Basu
7. Pharmacognosy – by Dr. Kokate
8. Naturals and Cosmetics – by Dr. Satish Sakharwade

Paper No. V
Paper Code: SCT1.1

ELEMENTARY MATHEMATICS

Unit-1: Algebra: - Profit and loss, percentage calculation, Logarithms, Trigonometry:
- Degrees and Radians trigonometric ratios. Identities for sum and difference of
angles, multiple angles. **(15 L)**

Unit-2: Statistics: - Frequency Distribution, Histogram, Representation of data in a
curve, Measures of Central tendency : Mean, Median, mode, Measures of
dispersion: Standard deviation, Correlation, Coefficient of correlation only.
(15 L)

Unit-3: Derivatives: Concept of derivative, derivative of some simple algebraic and
trigonometric functions. Chain rule. **(15 L)**

Unit-4: Application of Derivatives: Maxima, Minima b) Rates and motion c) Velocity
acceleration. **(15L)**

Reference Books

1. Higher Engineering Mathematics by B. S. Grewal (Unit I, II, V).
2. Higher Algebra by Hall and Knight (Unit I)
3. Plane Trigonometry Part I by S.L. Loney (Unit II)

Paper No. V
Paper Code: SCT1.1
ELEMENTARY STATISTICS

Unit-1: Introduction to data and types of data. Primary and Secondary data. Scales of measurement as ordinal, nominal, interval and ratio. (15 L)

Unit-2: Descriptive Statistics: Measures of central tendency, arithmetic mean, geometric mean, harmonic mean, median and mode for grouped and ungrouped data. Numerical Problems. (15 L)

Unit-3: Measures of dispersion: Range, quartile deviation, variance, standard deviation for grouped and ungrouped data. Numerical Problems. (15 L)

Unit-4: Correlation : Scatter diagram, Karl Pearson's coefficient of correlation. Formula for ungrouped data. Numerical Problems. (15L)

Reference Books

1. Fundamentals of Mathematical Statistics by S.C. Gupta and V. K. Kapoor

Practical Paper-I
Paper Code: HCP1.1
PRACTICAL –I

Cosmetic Chemistry

1. Preparation of Standard solutions: 1 normal, 1 molar, % w/v solution, % v/v solution 2. Standardization of volumetric apparatus.
3. Volumetric estimation involving Acidimetry, Alkalimetry oxidation & reductions.
4. Experiments based on limit tests of chlorides, Arsenic, ions sulphate & Heavy metals.
5. Practical significance of MSDS.

Fundamentals of Chemistry:

1. Organic Preparations based on:
 - i) Alkaline Hydrolysis
 - ii) Acidic Hydrolysis
 - iii) Acetylation
 - iv) Oxidation
2. Study of surface tension of liquids using a stalagmometer.
3. Study of Viscosity of liquids using Ostwald's Viscometer.
4. Study of variation of viscosity of liquid mixtures using an Ostwald's viscometer and its use to determine the concentration of such mixtures.
5. Study the total hardness of water
6. Study the temporary hardness of water.
7. Study the heat of solution of a salt in water.
8. Study the heat of neutralization of a strong acid by a strong base as well as weak acid and strong base using a calorimeter.

Practical Paper-II
Paper Code: HCP1.2
PRACTICAL –II

Anatomy & Physiology

1. Study with the help of Charts and models of-
 - a) Skin
 - b) Hair
 - c) Eye
 - d) Tooth
2. Microscopic examination of Epithelial, Cardiac, Smooth Muscles, Skeletal muscles and other tissues.

Natural Cosmetic Agents

1. Carbohydrates:
 - i. Study of organoleptic properties, identification and microscopic studies of:
 - a. Rice Starch b. Maize starch
 - c. Potato starch d. Wheat starch
 - ii.
 - a. Agar b. Gum Acacia.
 - c. Tragacanth. d. Gaur Gum
 - e. Pectin f. Cellulose
2. Study of chemical identification of fixed oils and waxes.
3. Detection of Adulteration in Olive oil, Coconut oil, Almond oil, and other vegetable oil.

Paper No. VI
Paper Code: HCT2.1

COSMETIC CHEMISTRY – II

Unit-1: Nernst eq. Calculation of std. Potential, oxi-red titrations, study of common oxidizing agents and reducing agents, oxi-red curves, ceric ammonium sulfate, titanous chloride, 2-6 dichlor phenol indo phenol titration, their theory and applications. **(15 L)**

Unit-2: Iodometry and iodimetry, Gravimetric analysis. Quantitative separation, solubility product. Fractional precipitation, CO - & post precipitation Practical aspects of gravimetry and applications. **(15 L)**

Unit-3: Precipitation titration, Precipitation and complex forming reactions. Argentometric Titration, Gay-Iusac, Volhard's Mohr's and Fujan's Method. Mercuric nitrate titration. Complexometric titration, concepts of complexation and chelation, co-ordination number stability constant, titation curves, metal ion indicator, Masking and demasking agents, types of complexometric titration and applications **(15 L)**

Unit-4: Determination & significance of acid value, saponification value, iodine value, ester value. **(15 L)**

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

Paper No. VII
Paper Code: HCT2.2

ANATOMY & PHYSIOLOGY – II

Unit-1: I) Cardiovascular system Anatomy of Heart, flow of blood through heart, blood pressure, structure of artery, vein and capillaries.

II) Blood –

- i) Composition & Function ii) Blood groups
- iii) Coagulation of blood **(15 L)**

Unit-2: Respiratory system – Anatomy of organs, mechanism of respiration. **(15 L)**

Unit-3: (i) Digestive system – Anatomy of digestive organs, Digestion of carbohydrate, protein and fat.

(ii) Excretory system – organs of excretion, structure of kidney, Mechanism of urine formation. **(15 L)**

Unit-4: Nervous system – CNS, Brain, anatomy in short, spinal cord, ganglion cranial nerves, reflex action and reflex arch. **(15 L)**

Reference Books:

1. Best and Taylor – The Living Body.
2. Kimber and Gray – Human Physiology and Anatomy
3. Fransis – Introduction to Human Anatomy.
4. Pharmacology and Pharmacotherapeutics By R.S. Satoskar and S. Bhandarkar
5. Ross & Wilson – Anatomy and physiology in health and illness – Ross & Wilson
6. Anatomy and physiology for Nurse – Windwood R.S.

Paper No. VIII
Paper Code: HCT2.3

FUNDAMENTALS OF CHEMISTRY

Unit-1: Halohydrocarbon: Preparation and reaction of alkyl halide and Grignard reagents and chloroform. Alcohols – Definition, classification, preparation, properties and chemical reaction of alcohols, fermentation, manufacture of ethyl alcohol, proof spirit, denatured alcohol, glycol and glycerol. (15 L)

Unit-2: Benzene and other aromatic compounds:

- i) Benzene Resonance and structure – o-p & meta directing effect.
- ii) Aromatic nitro compound (Nitrobenzenes): preparation & properties,
- iii) Aromatic amines (Aniline) – Preparation & Properties.
- iv) Aromatic carboxylic acids (Benzoic and Cinnamic acid, Salicylic acid.)
Fats & Oil : Definition, uses, properties. Analysis of fats and oils. Application of fats and oils in cosmetics. (15 L)

Unit-3: Law of mass action, Le-Chatelier's principle, homogeneous gaseous equilibria and homogeneous equilibria in liquid system.

Chemical kinetics: Introduction, molecularity, order and rate of reaction. Kinetics of first and second order reaction, their characteristics and some methods of determination. (15 L)

Unit-4: Phase rule : Phase rule, the terms involved in it and applications to one component system, water and sulphur system. Introduction to two component systems.

Solutions,: Raoult's law, and it's application, molecular weight determination by measuring vapour pressure, Boiling Pt. & freezing point. (15 L)

Reference Books:

1. Text Book of Organic Chemistry by Morrison and Boyd.
2. L.M. Atherdon, Bentley and Driver's Text Books of Pharmaceutical Chemistry. Oxford University Press, London.
3. Text book of Organic Chemistry by Bahl & Bahl
4. A.N. Martin – Physical Pharmacy
5. Glasstone – Elements of Physical Chemistry
6. A. J. Med – Physical Chemistry

Paper No. IX
Paper Code: HCT2.4
NATURAL COSMETIC AGENTS – II

Unit-1: Adulteration - types of adulteration, Method of adulteration and methods of detection of adulteration in Natural ingredients. **(15 L)**

Unit-2: Resin and balsum -

- a) Definition, classification and general identification tests.
- b) Study of following - Balsum of Tolu, Balsum of Peru, Benzoin, Storax, Colophony, Asafoetida. **(15 L)**

Unit-3:Tannins – Definition, Classification and Identification test.

Study of the following – Black Catechu, Tannic Acid, Amla, Behra, Hirida, Arjun, Pale catechu, Ashok. **(15 L)**

Unit-4: Study of mineral ingredients. Kaolin, Bentonite, Talc., Fuller’s earth, Mica, Calamine. Herbs description and morphology of organized and unorganized herbs. **(15 L)**

Reference Books:

1. Text book of Pharmacognosy – Trease and Evan’s
2. Pharmacognosy – By Claus and Tayler.
3. Text Book of Pharmacognosy – T. E. Wallis.
4. Materia Medica – By Nadkarni.
5. Wealth of India – CSIR
6. Indian medical plants: by Kirtikar & Basu
7. Pharmacognosy – by Dr. Kokate
8. Naturals and Cosmetics – by Dr. Satish Sakharwade

Paper No. X
Paper Code: SCT2.1

ENGLISH COMMUNICATION SKILLS

Unit-1: Writing skills:- Letter Writing, Informal letter, Formal letter, Bio-data/Resume, job Application, Report Writing: Dialogue writing, Advertisement .

(15 L)

Unit-2: Personality Development: Effective Public speaking, Goal setting, time management, stress management. **(15 L)**

Unit-3: Speech Writing : View and Counterview, Expansion of Ideas, completion and Developing a story. Listening skills: Loud Reading, Speaking, Conversations, Telephonic conversation. **(15 L)**

Unit-4: Interview techniques, group discussion, situational role play. **(15 L)**

Paper No. X
Paper Code: SCT2.2

ANALYTICAL CHEMISTRY

Unit-1: pH metry: pH and hydrogen ion concentration, pH calculation for weak acids and weak bases. Buffer solutions and types, mechanism of buffer action of acidic and basic buffers. Theories of acid base indicators. **(15 L)**

Unit-2: General discussion of theory of colorimetry : Lambert law, Beer's law (Derivation not expected), Terms used in Colorimetry, Application of Beer's law, Deviation from Beer's law. Classification of methods of 'colour' measurement or comparison, Photoelectric photometer method- single cell photo-electric colorimeter. **(15 L)**

Unit-3: E.M.F. of Galvanic cell, Std. Oxidation Potential of an electrode, glass, calomel, redox electrodes, Principles of potentiometric titration. **(15 L)**

Unit-4: Electrolysis, Faraday's laws, Cathode current efficiency. Basic principles of electroplating, cleaning of articles. Electroplating of Nickel and Chromium. Anodising. **(15 L)**

Reference Books:

1. Text book of Quantitative Inorganic Analysis - By A. I. Vogel (ELBS and Longman 3rd Edition).
2. Instrumental methods of Chemical analysis by Willard, Merit and Dean.
3. Instrumental methods of Chemical analysis by Chatwal and Anand (Himalaya Publication).
4. Text Book of Physical Chemistry by S. Glasstone, Macmillan India Ltd.
5. Elements of Physical Chemistry by D. Lewis and S. Glasstone (Macmillan).
6. Principles of Physical Chemistry by Maron and Lando (Amerind).
7. An Introduction to Electrochemistry by S. Glasstone.

Practical Paper-III
Paper Code: HCP2.1
PRACTICAL-III

Cosmetic Chemistry (P2)

1. Preparation and standardization of Ceric Ammonium Sulphate Potassium Iodate, Assays Based on use of above agents.
2. Preparation and standardization of Perchloric Acid and Sodium Methoxide. Assay based on above.
3. Preparation and standardization of Sodium EDTA. Assay based on EDTA.
4. Preparation and Standardization of Silver Nitrate and Ammonium Thiocyanate. Assay Based on above.
5. Gravimetric analysis: experiments based on gravimetric analysis

Fundamentals of Chemistry

1. Systematic Organic analysis of unknown organic substance (i.e. preliminary tests, detection of elements, groups, determination of physical constants and specific tests and confirmation by derivatives preparation)
 - a) Acetic acid
 - b) Benzoic acid
 - c) Salicylic acid
 - d) Urea
 - e) Thiourea
 - f) Aniline
 - g) Glucose
2. Study the phenol – water two phase system and determine the critical temperature of the system.
3. Determine the molecular weight of a nonvolatile compound by the Rast's Camphor method.
4. Study of partition of iodine between Carbon Tetrachloride and water and determine the partition coefficients of iodine between the two solvents.
5. Study the first order kinetics of the hydrolysis of Methyl Acetate in an acid medium.
6. Study the second order kinetics of the reaction of $K_2S_2O_8$ with KI.
7. Study of Buffer solutions and hence determine the pH of buffer solution using a comparator.

Practical Paper-IV

Paper Code: HCP2.2

PRACTICAL-IV

Anatomy & Physiology

1. Determination of clotting time.
2. Determination of bleeding time
3. Determination of hemoglobin content.
4. Determination of R.B.C. count, D.L.C., T.L.C.
5. Study with the help of charts and models of
 - a) Cardiovascular system
 - b) Excretory system
 - c) Digestive system
 - d) Nervous system
6. Recording of body temperature, Pulse and Heart rate and Blood Pressure.

Natural Cosmetic Agents

1. Organoleptic study and identification of
 - a. Tolu Balsum
 - b. Peru Balsum
 - c. Benzoin
 - d. Storax
 - e. Colophony
 - f. Asfoetida
2. Morphological study and identification of following tannin containing agents:
 - a. Black Catechu.
 - b. Amls
 - c. Behra
 - d. Hirada
 - e. Ashoka Bark
 - f. Arjua Bark.
3. Organoleptic study of Kaolin, Bentonite, Talc., Fuller's earth, Mica, Calamine.
