University of Kerala

Discipline	CHEMISTRY				
Course Code	**UK4DSECHE203**				
Course Title	**INDUSTRIAL CHEMISTRY-II**				
Type of Course	**DSE**				
Semester	4				
Academic Level	200 - 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	UK3DSECHE203 (preferable)				
Course Summary	This course equips students with the theoretical knowledge and practical skills required for the formulation, production, and quality assessment of a wide range of household and personal care products such as soaps, detergents, shampoos etc. emphasizing both traditional and green chemistry approaches.				

Detailed Syllabus:

Module	Unit	Content INDUSTRIAL CHEMISTRY II	Hrs 75
I	**SOAPS AND DETERGENTS**		**9**
	1	Chemical compositions of soap, Oils and fats, their sources, structure and composition. Glycerides and fatty acids, their nomenclature and classification.	1
	2	Soaps and synthetic detergents, raw materials for soaps, General principles of soap making, Manufacture of soaps-Cold, semi boiled and full boiled processes.	2
	3	Basic concepts of surface-active agents, builders, additives, fillers, perfuming and colouring, Types of soaps, Differences between soaps and detergents.	2
	4	Various types of detergents, classification of detergents -anionic, cationic, nonionic, amphoterics, biodegradability, Theory of cleansing action of soaps and detergents.	2
	5	Determination of Total Fatty matter in soap, Saponification value, iodine value and acid value.	2
II	**CLEANERS AND DISINFECTANTS**		**9**
	6	Introduction, Disinfectant efficacy, Different types of cleaners and disinfectants, natural and synthetic cleaning agents, Qualities of good	2

		cleaners, Disinfection and sterilization.	
	7	Chemistry of cleaning action and disinfection, Floor, Bathroom and Toilet cleaners, Formulation and manufacture of disinfectants - Hypochlorite (Javel water), Dettol, Pine jelly (giant), Surface disinfectants.	3
	8	Common disinfectants – Alcohols, Chlorine and its derivatives, Aldehydes. Phenols, Peroxide.	2
	9	Various types of floor cleaners, Ingredients, Raw material required, Manufacturing process of floor cleaners, Making of herbal-floor cleaners.	2
III	**HAND SANITIZERS**		**9**
	10	Introduction – common sanitization and antiseptic agents, types of sanitizers – chlorine-based sanitizer, quaternary ammonia concentration, Iodine concentration sanitizer and their characteristics.	3
	11	Uses of hand sanitizer, raw materials - identification, selection of commercially available materials (Turmeric, Sandal, Tulsi, Neem, alcohol etc.), Solvent – selection of solvents, solvent purity, viscosity, odour, colour of the solvent, common solvents used.	3
	12	Manufacturing of hand sanitizers, making of natural and synthetic hand sanitizers, herbal hand sanitizers - alovera hand sanitizer, neem hand sanitizer.	3
IV	**COSMETICS AND SHAMPOOS**		**18**
	13	Introduction - Basic concepts, Composition and production of skin care products: Face wash, Moisturizing cream, Cold Cream, Vanishing cream, their relative skin sensory composition.	4
	14	Sun protection -Classification and composition of sunscreen and suntan lotions and SPF, Composition and of Deodorants, Talcum powder, lipsticks.	3
	15	Hair care facts, Composition of hair care products: Shampoo, Hair conditioners and Hair oils.	3
	16	Evaluation of Shampoos, pH concept and testing for all types of shampoos. Harmful effects of cosmetics.	2
	17	Herbal Cosmetics- Definition, Natural Ingredients Used- Aloe Vera, Turmeric, Henna, Amla, Neem, Clove.	3
	18	Olive oil, Wheat germ oil, Almond oil and Tea – tree oil with special emphasis on their source, active principles and cosmetic properties.	3
V	**PRACTICALS** **A minimum of five practicals from the following must be performed and reported**		**30**
	1. Determination of TFM in soaps. 2. Determination of Saponification value, iodine value and acid value. 3. Manufacture of bathing soaps. 4. Manufacture of laundry soaps. 5. Making of liquid detergent. 6. Preparation of Hand wash		

	7. Preparation of sanitiser. 8. Preparation of hair shampoo.	

References

1. *Vogel's Textbook of Practical Organic Chemistry, 5 Edition,* Pearson India, 2003.
2. Mendham, J., Denney, R. C., Barnes, J. D., & Thomas, M. J. K. *Vogel's Textbook of Quantitative Chemical Analysis*. 6th ed., Longman ELBS, Harlow, 2000.
3. Shetty, Majur Chandrashekar. *Small-scale and Household Industries in a Developing Economy: A Study of Their Rationale, Structure and Operative Conditions*. Asia Publishing House, 1963.
4. Sharma, B. K. *Industrial Chemistry Including Chemical Engineering*. Goel Publishing House, 2000.
5. Balsam, S.M., Gershon, S.D, Rieger, M.M, Sagarin, E, and Strianse S.J: *COSMETICS–Science and Technology, 2nd edition*, Vol-2, John Wiley India, New Delhi, 2008.
6. Barel, A.O, Paye, M and Maibach, H.I: *Handbook of Cosmetic Science and Technology,* 3rd Edition, Informa Healthcare, New York.
7. K. Joseph and G. D. G. Mathew, *Advanced Practical Polymer Chemistry*, 2nd ed. Kottayam: Polymer Publication, 2004.
8. O P Vermani, A.K. Narula: *Industrial Chemistry*, Galgotia publications pvt. Ltd, New Delhi.
9. Bhatia, S. C. *Perfumes, Soaps, Detergents & Cosmetics: Volume 1 & 2: Soaps and Detergents*. 1st ed., CBS Publishers & Distributors, 2009.

Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Understand the chemistry and manufacturing processes of soaps and synthetic detergents.	An	PSO-1,2,3
CO-2	Analyse the chemical composition of cleaning agents and cosmetics.	An	PSO-1,2
CO-3	Understand the chemical theory behind the efficacy of the cleansing agents and cosmetics	E	PSO-1,2
CO-4	Explore the composition and production of hair care products	C	PSO-1,2
CO-5	Hands-on experience in manufacturing bathing and laundry soaps, liquid detergent, bleach, toilet and floor cleaners, hand wash, sanitizers, and hair shampoo	C	PSO-1,2,4

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: INDUSTRIAL CHEMISTRY-II

Credits: 3:0:1 (Lecture:Tutorial:Practical)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/ Tutorial (T)	Practical (P)
1	CO-1	PSO-1,2,3	An	C	L	
2	CO-2	PSO-1,2	An	C	T	
3	CO-3	PSO-1,2	E	C	L	
4	CO-4	PSO-1,2	C	C	T	
5	CO-5	PSO-1,2,4	C	C, M		P

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO 1	3	2	3	-	-	3	3	-	-	-	-	-	-
CO 2	3	2	-	-	-	1	3	-	-	-	-	-	-
CO 3	3	2	-	-	-	3	3	-	--	-	-	-	-
CO 4	3	2	-	-	-	3	3	-	-	-	-	-	-
CO 5	3	3	-	3	-	3	3	-	-	-	-	-	-

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam

- Programming Assignments
- Final Exam

Mapping of Cos to Assessment Rubrics:

	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓			✓
CO 3	✓			✓
CO 4	✓			✓
CO 5	✓	✓		✓