



University of Kerala

Discipline	CHEMISTRY				
Course Code	UK3DSCCHE204				
Course Title	CHEMISTRY UNVEILED: EVERYDAY APPLICATIONS				
Type of Course	DSC				
Semester	3				
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	1. Higher secondary level science knowledge 2. First & second semester DSCs (chemistry) offered by UoK (preferable)				
Course Summary	The course covers textile chemistry, food chemistry, chemistry and agriculture, basics of perfumery, cosmetics, paper manufacturing, and drug classification. Practical sessions encompass dyes, food analysis, drug analysis, and fertilizer analysis, offering hands-on experience.				

Detailed Syllabus:

Module	Unit	Content	Hrs
		CHEMISTRY UNVEILED: EVERYDAY APPLICATIONS	75
I	TEXTILE CHEMISTRY		9
	1	Definition, Requisite of a true dye, Types of fibres: structure features of fibres (Cotton, wool, silk, cellulose acetate, polyamide, polyesters)	3
	2	Basic operations in dyeing process (preparation of the fibre, preparation of dye bath, application of dye and finishing), Various methods of dyeing (direct dyeing, vat dyeing, Mordant Dyeing, and disperse dyeing).	3
	3	Witt's theory of colour and constitution, classification of dyes based on their functional group- i) Nitro ii) Nitroso and iii) Azo, Pollution problem due to dye industry.	3
II	FOOD CHEMISTRY		9
	4	Food additives – definition. Preservatives (examples), Food colours - permitted and non-permitted (examples), Toxicology. Flavours - natural and synthetic (examples),	3
	5	Artificial sweeteners (examples), Emulsifying agents (examples), Antioxidants (examples), Leavening agents (examples) and Flavour enhancers (examples). Importance of food additives.	3
	6	Soft drinks - formulation and health effects. Health drinks.	1

	7	Fast foods and junk foods and their health effects. Food adulteration (with examples). Food laws and standards. Food Safety and Standards Act, 2006.	2
III	CHEMISTRY AND AGRICULTURE		9
	8	Fertilizers – Introduction. Types of fertilizers - Natural, synthetic, mixed, NPK fertilizers (examples). Excessive use of fertilizers and its impact on the environment. Bio-fertilizers. Plant growth hormones.	4
	9	Pesticides - Introduction. Classification - Insecticides, Fungicides, Herbicides.	3
	10	Excessive use of pesticides - Environmental hazards. Bio pesticides.	2
IV	PERFUMERIES, COSMETICS, PAPERS, & DRUGS		18
	11	Perfumes: Definition and history of perfumery - Importance of perfumes in society and culture, Classification of fragrance ingredients (natural vs. synthetic – with examples), Chemical structure and properties of key fragrance compounds (terpenes, aldehydes, ketones, esters, etc. with examples) Relationship between chemical structure and fragrance.	5
	12	Cosmetics - Introduction. General formulation of different types of cosmetics – Dental cosmetics, Shampoos, Hair dyes, Skin products (creams and lotions, lipstick, perfumes, deodorants and antiperspirants), Bath oil, Shaving cream and Talcum powder. Toxicology of cosmetics.	5
	13	Paper – Introduction. Paper manufacture (basic idea only). Weight and size of paper. Types of paper - News print paper, writing paper, paperboards, cardboards. Environmental impact of paper. International recycling codes, and symbols for identification of paper, plastic and metals. Natural and synthetic dyes in paper industry with examples (elementary idea only).	5
	14	Classification of drugs - Analgesics, Antipyretics, Antihistamines, Antacids, Antibiotics and Antifertility drugs with examples. Psychotropic drugs - Tranquilizers, Antidepressants and Stimulants with examples. Drug addiction and abuse. Prevention and treatment.	3
V	PRACTICALS – Organic Preparations, Dyes, Food analysis, Drug analysis, Fertilizer analysis		30
	15.	Section A (Any 5 Experiments from Section A are compulsory) Organic preparation: 1. Acetylation of salicylic acid or aniline 2. Benzoylation of phenol or aniline 3. Nitration of Acetanilide or nitrobenzene 4. Halogenation: Bromination of acetanilide 5. Oxidation of benzaldehyde/Toluene/Benzyl chloride 6. Hydrolysis of ethyl acetate and benzamide 7. Methyl orange 8. Picric acid 9. Phenyl urea 10. Methylene blue	15

	16. Section B (Open ended: Any 3 experiments are to be conducted - May be selected from the list or the teacher can add experiments) 1. Dichrometric titrations: 2. Iodimetry and Iodometry 3. Complexometric titrations: 4. Complexometric Titration: Determination of calcium content in milk. 5. Precipitation Titration: Determination of salt content in potato chips 6. Estimation of saponification value of fats/oils. 7. Determination of hardness of water. 8. Determination of available chlorine in bleaching powder. 9. Redox Titration: Determination of Vitamin C Content in Tablets. 10. Complexometric Titration: Determination of Magnesium Content in Antacids. 11. Precipitation Titration: Determination of Chloride Content in Saline Solutions. 12. Redox Titration: Determination of Iron Content in Iron Supplements 13. Complexometric Titration: Determination of Zinc Content in Zinc Supplements. 14. pH meter: Determination of pH of Fertilizer Solution.	15
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References

1. *Text Book of Organic Chemistry*: B.S. Bahl and G.D. Tuli, S. Chand Publication, New Delhi.
2. *A Text Book of Engineering Chemistry*, S.S. Dara and Suresh Umare, S. Chand Publication, New Delhi.
3. *A Text Book of Basic and Applied Chemistry*, P.C. Jain and Monica Jain.
4. *Text Book of Organic Chemistry* by J. L. Finar, Longman Publication.
5. *Synthetic Dyes* by G R Chatwal, Himalaya Publishing House, New Delhi.
6. *Organic Chemistry of Natural Products* Vol. I and II, by G. R. Chatwal, Himalaya Publishing House, New Delhi.
7. *Food Science*, B. Sreelakshmi, New Age International, New Delhi.
8. *Soil Fertility and Fertilizers*, S.L. Tisdale; W. L. Nelson and J. D. Beaton, Macmillan Publishing Company, New York, 1990.
9. *Chemistry of Pesticides*, K. H. Buchel, John Wiley & Sons, New York, 1983.
10. *Insecticides, Pesticides and Argo based Industries*, P.C. Pall; K. Goel and R.K. Gupta.
11. *Perfumes, Cosmetics, Soaps* Vol. I, II and III by W. A. Poucher, Ninth Edition, Chapman and Hall Publication.
12. *New Cosmetic Science* by Takeo Mitsui, Elsevier.
13. *Medicinal Chemistry*, D. Sriram and P. Yogeewari, 2nd edn. Pearson, 2011.
14. *Synthetic Drug* by G R Chatwal and Anand, Himalaya Publishing House, New Delhi.

15. *Vogel's Textbook of Practical Organic Chemistry* Furniss, B.S.; Hannaford, A.J.; Rogers, V. Smith, P.W.G.; Tatchell, A.R., 5th ed., Pearson Education.
16. *Practical Organic Chemistry*, Mann, F.G.; Saunders, B.C., 4th ed., Pearson Education.
17. *Comprehensive Practical Organic Chemistry – Preparation and Quantitative Analysis* Ahluwalia, V.K.; Aggarwal, R. Universities Press.
18. *Advanced Practical Organic Chemistry*, Vishnoi, N.K., 3rd ed., Vikas Publishing House, New Delhi, 2010.

Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Critically analyze the structural characteristics of natural and synthetic fibers, understand and apply various dyeing techniques and processes, evaluate dye classifications based on chemical functionality and Witt's theory of color, and assess the environmental impact of dye industry pollution, enabling informed decisions in textile chemistry and sustainable practices.	An	PSO-1,2,3,4
CO-2	Critically analyze the types, functions, and safety aspects of food additives—including preservatives, colors, flavors, sweeteners, emulsifiers, antioxidants, leavening agents, and flavor enhancers—evaluate the formulation and health impacts of soft drinks, health drinks, fast and junk foods, identify common food adulterants, and interpret relevant food laws and standards, to ensure informed decisions in food quality and safety management.	E	PSO-1,2,3,4
CO-3	Critically analyze the types, applications, and environmental impacts of fertilizers and pesticides, including natural, synthetic, bio-fertilizers, and bio-pesticides, and evaluate sustainable practices for their responsible use in agriculture.	An	PSO-1,2,3,4
CO-4	Critically analyze the chemistry, formulation, classification, and societal impact of perfumes, cosmetics, paper, and drugs—understanding their chemical properties, applications, toxicology, environmental considerations, and the role of synthetic and natural components in these everyday materials and pharmaceuticals.	C	PSO-1,2,3,4
CO-5	Develop advanced practical skills in organic synthesis, qualitative and quantitative analytical techniques, including	C	PSO-1,2,3,4,5

	titrations and instrumental methods, enabling them to accurately perform and interpret a wide range of chemical preparations and estimations relevant to real-world applications.		
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R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: CHEMISTRY UNVEILED: EVERYDAY APPLICATIONS

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	PO-1,3,6 PSO-1,2,3,4	An	F, C, P	L	-
2	CO-2	PO-1,3,6 PSO-1,2,3,4	E	C, P, M	L	-
3	CO-3	PO-1,3,6 PSO-1,2,3,4	An	C, P, M	L	-
4	CO-4	PO-1,3,6 PSO-1,2,3,4	C	C, P, M	L	-
5	CO-5	PO-1,3,6 PSO-1,2,3,4,5	C	P, 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	3	3	2	-	2	-	2	-	-	2	-	-
CO 2	3	3	3	2	-	2	-	2	-	-	2	-	-
CO 3	3	3	3	2	-	2	-	2	-	-	2	-	-
CO 4	3	3	3	2	-	2	-	2	-	-	2	-	-
CO 5	2	2	3	2	3	2	-	3	-	-	3	-	3

Correlation Levels:

Level	Correlation
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-	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	✓		✓	✓