SEMESTER III

USCHA320 - SKILL BASED ELECTIVE: INDUSTRIAL CHEMISTRY

Year: II SEM:III	Course Code USCHA320	Title of the Course Industrial Chemistry	Course Type Theory	Course category Skill Based Elective	H/W 2	Credits 2	Marks 100

Learning Objectives:

1. To acquire an in depth knowledge on various areas of industrial chemistry like polymers, leathers, textile, fuels, glasses, ceramics, cements and paints.
2. To help the students enhance the reasoning skills and understand the working of industrial processes.

Course Outcomes:

The Learners will be able to

1. Discuss the composition, characteristics and manufacture of various industrial products. (Polymer, Leather, Textile, Glass, Ceramics, Cements, Paints and Pigments).
2. Explain the various process involved in the manufacture of leathers and leather products.
3. Describe the importance of natural and synthetic fibres in textile industry.
4. Understand the classifications of fuels and learn the common terms related to it.
5. Understand how to implement the concepts in industrial working environment.

CO	PSO					
	1	2	3	4	5	6
CO1	H	H	H	H	M	H
CO2	H	H	H	H	M	H
CO3	H	H	H	H	M	H
CO4	H	H	H	H	M	H
CO5	H	H	H	H	M	H
CO	PO					
	1	2	3	4	5	6
CO1	H	H	H	H	M	H
CO2	H	H	H	H	M	H

CO3	H	H	H	H	M	H
CO4	H	H	H	H	M	H
CO5	H	H	H	H	M	H

Unit I: (6 Hours)

1.1 Introduction- terms involved in polymers. (K1 & K2)
1.2 Classification of polymers. (K1, K2& K3)
1.3 Polymerization, types of polymerization. (K1, K2 & K3)
1.4 Preparation, properties and uses of natural polymers. (K1 & K2)
1.5 Preparation, properties and uses of synthetic rubber- polyvinyl chloride, polyester, polyamide. (K1, K2 & K3)
1.6 Biodegradable polymers. (K1 & K2)

Unit II: (6 Hours)

2.1 Introduction-constituent of animal skin. (K1 & K2)
2.2 Preparation of hides for tanning. (K1 & K2)
2.3 Process - cleaning and soaking, liming and unhairing, deliming, bating and pickling. (K1, K2 & K3)
2.4 Leather tanning-vegetable and chrome tanning. (K1, K2 & K3)
2.5 Finishing process- dyeing and fat liquoring. (K1, K2 & K3)
2.6 Cleaner processing and practices in beam house, Effluent treatment (K1, K2 & K3)

Unit III: (6 Hours)

3.1 Introduction to textile fibres-Classificationof textile fibres. (K1 & K2)
3.2 Differences between natural and synthetic fibres. (K1 & K2)
3.3 Synthetic fibres- Preparation and properties of Rayon and Nylon. (K1, K2 & K3)
3.4 Textile chemical processing for the fibres-Singeing, de-sizing, scouring, bleaching, mercerization. (K1, K2, K3 & K4)
3.5 Textile dyes- difference between pigments and dyes. (K1 & K2)
3.6 Classification of dyes- vat dyes, Azo dyes, chrome dyes, Acid and base dyes. (K1 & K2)

Unit IV: (6 Hours)

4.1 Introduction- Classification of fuels. (K1 & K2)
4.2 Solid fuel-coal and coke- composition and properties. (K1 & K2)
4.3 Liquid fuel- Petroleum processing and fractions, Biofuels.(K1 & K2)
4.4 Cracking- catalytic cracking and methods-Knocking- octane number and cetane number. (K1, K2 & K3)
4.5 Synthetic petrol-Fischer Tropsch and Bergius processes. (K1, K2 & K3)
4.6 Fuel gases- Natural gas and Water gas. (K1 & K2)

Unit V: (6 Hours)

5.1 Glass- Raw materials- characteristics. (K1 & K2)

5.2 Methods of Manufacture- melting, shaping, annealing, finishing- special glasses. (K1, K2 & K3)

5.3 Refractories- characteristics, classification and properties. (K1 & K2)

5.4 General methods of manufacture of refractories. (K1, K2 & K3)

5.5 Cement- composition, setting of cement- crystalline and colloidal theory. (K1, K2 & K3)

5.6 Paints and pigments- Constituent of paints, pigments- white lead, ultramarine, Chrome yellow. (K1, K2 & K3)

References:

1. B.K. Sharma, Industrial Chemistry, Goel Publishing House, Meerut, 2016.
2. B.N.Chakrabarty, Industrial Chemistry, Oxford & IBH Publishing Co, New Delhi, 1981.
3. P.C. Jain, Monika Jain, Engineering Chemistry, Dhanpat Rai Publishing Co (P) Ltd, 2018.
4. K. SeshaMaheswaramma, MridulaChugh, Engineering Chemistry, Pearson Education India, 2016.
5. Thomas Bechtold, Tung Pham, Textile Chemistry, Walter de Gruyter GmbH & Co, 2019.
6. Jayashree Ghosh, A Textbook of Pharmaceutical Chemistry, S.Chand and Company Ltd., Reprint 2013.

Open Educational Resources (OER):

1. https://plastics.americanchemistry.com/How-Plastics-Are-Made/
2. http://wwwchem.uwimona.edu.jm/courses/CHEM2402/Textiles/Leather.html
3. http://www.petroleum.co.uk/
4. https://nios.ac.in/media/documents/313courseE/L34A.pdf

SEMESTER 1V

USCHB420 - SKILL BASED ELECTIVE: AGRICULTURAL CHEMISTRY

Year: II **SEM: IV**	**Course Code** USCHB420	**Title of the Course** Agricultural Chemistry	**Course Type** Theory	**Course Category** Skill Based	**H/ W** 2	**Credits** 2	**Marks** 100

Learning Objectives:

1. To impart elementary ideas of soil chemistry, types of farming, insecticides, fungicides and herbicides.
2. To emphasize the importance of fertilizers.

Course Outcomes:

The Learners will be able to

1. Understand the scope of agriculture in India and Tamil Nadu.
2. Explain the physical and chemical properties of soil.
3. Describe the types of farming.
4. Summarize the certification of organic products.
5. Identify the benefits and adverse effects of pesticides.

CO	**PSO**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	H	H	H	H	M	H
CO2	H	H	H	H	M	H
CO3	H	H	H	H	M	H
CO4	H	H	H	H	M	H
CO5	H	H	H	H	M	H

CO	**PO**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	H	H	H	H	M	H
CO2	H	H	H	H	M	H

CO3	H	H	H	H	M	H
CO4	H	H	H	H	M	H
CO5	H	H	H	H	M	H

Unit I: (6 Hours)

1.1 Agriculture – Definition – Scope of agriculture in India and Tamil Nadu. (K1 & K2)
1.2 Branches of agriculture. (K1 & K2)
1.3Agronomy – Art, Science and business of crop production. (K1 & K2)
1.4 Agronomical classification of crops - their importance. (K1 & K2)
1.5 Major crops of India and Tamil Nadu, Water resources in Tamil Nadu. (K1 & K2)
1.6Factors affecting crop production – Moisture, aeration, light, temperature and nutrients. (K1 & K2)

UnitII:(6 Hours)

2.1 Soil chemistry – Introduction, soil classification and survey. (K1 & K2)
2.2 Properties of soil – soil texture and soil water. (K1 & K2)
2.3 Soil temperature and soil colloids. (K1 & K2)
2.4 Soil minerals and soil pH. (K1 & K2)
2.5 Soil acidity – alkalinity and buffering soil. (K1 & K2)
2.6 Soil fertility and soil formation. (K1 & K2)

Unit III: (6 Hours)

3.1 Farming – types – subsistence farming and commercial farming. (K1 & K2)
3.2 Plantation farming, mixed farming and conventional farming. (K1 & K2)
3.3 Organic farming, poultry farming and dairy farming. (K1 & K2)
3.4 Advantages of organic farming- limitation of organic farming. (K1 & K2)
3.5 Certification of organic products – OFAI organic labeling system. (K1 & K2)
3.6 Research findings on organic food. (K1 & K2)

Unit IV: (6 Hours)

4.1 Insecticides, Fungicides and Herbicides - Introduction. (K1 & K2)
4.2 Methods of using pest controls. (K1 & K2)
4.3 Insecticides – Arsenic compounds, fluorine compounds and boron compounds. (K1 & K2)
4.4 Insecticides- mercury compounds, copper compounds and sulphur compounds. (K1 & K2)
4.5 Modern insecticides – some important herbicides -Rodenticides. (K1 & K2)
4.6 Benefits of Pesticides, Adverse environmental effects of Pesticides. (K1 & K2)

Unit V: (6 Hours)

5.1 Fertilizers – Classification- Examples of fertilizers. (K1 & K2)
5.2 Nitrogenous fertilizers- phosphate fertilizers- potash fertilizers. (K1 & K2)

5.3 Ill effects of fertilizers. (K1 & K2)
5.4 Manures, compost and saw dust. (K1 & K2)
5.5 Farmyard manure, compost, reinforcing manure and green manure. (K1 & K2)
5.6 Sewage and sludge - biogas production. (K1 & K2)

References:

1. Sankaran, S. and V.T. Subbiah Mudaliar. Principles of Agronomy. The Bangalore Printing and Publishing Co. Ltd., Bangalore. 1997
2. Principles and Practices of Agronomy. Agrobios. Jodhpur - 342 002.
3. Jayashree Ghosh. Fundamental Concepts of Applied Chemistry. S. Chand Publishing Ltd., 2006.
4. Kirpal Singh. Chemistry in Daily life 1st Edition, Prentice Hall of India Pvt. Ltd., 2008.

Open Educational Resources (OER):

1. https://nptel.ac.in/courses/126/105/126105016/
2. https://nptel.ac.in/courses/126/105/126105016/
3. https://nptel.ac.in/content/storage2/courses/103107086/module1/lecture1/lecture1.pdf
4. https://nptel.ac.in/courses/126/105/126105014/

UGCHB520/620 -COSMETICS AND DYES

Year: III SEM: V/VI	Course Code: UGCHB520/620	Title of the Course: Cosmetics and Dyes	Course Type: Theory	Course Category: Elective	H/W 3	Credits 2	Marks 100

Learning Objectives:

1. To give a basic introduction to cosmetics, their classification and uses.
2. To give a broad overview on the disadvantages of using synthetic cosmetics over herbal cosmetics, cosmetic safety and evaluation method, etc.
3. To give an introduction to dyes and their applications in various industries from textile to pharmacy and food, contribution of various industries to environmental pollution and its effect on human health.

Course Outcomes:

The learners will be able to

1. Define and classify cosmetics, deodorants, antiperspirants, perfumes, aerosols and identify the pros and cons of synthetic cosmetics.
2. Describe the safety assessment methods used by FDA.
3. Prepare and use fruits and vegetables based herbal cosmetics and evaluate the significance of aromatherapy and apply it to human health and beauty.
4. Explain the properties of natural and synthetic dyes.

5. Understand the impact of dyes used in textile and leather industry to environmental pollution and analyse the importance of dyes in pharmaceutical and food industry.

CO	PSO					
	1	2	3	4	5	6
CO1	H	M	H	H	H	H
CO2	H	M	H	H	H	H
CO3	H	M	H	H	H	H
CO4	H	M	H	H	H	H
CO5	H	M	H	H	H	H

CO	PO					
	1	2	3	4	5	6
CO1	H	H	H	H	M	H
CO2	H	H	H	H	M	H
CO3	H	H	H	H	M	H
CO4	H	H	H	H	M	H
CO5	H	H	H	H	M	H

Unit I: (9 hours)

1.1 Cosmetics – definition & classification based on use. (K1, K2)
1.2 Components of cosmetics. (K1, K2)
1.3 Deodorants, antiperspirants. (K1, K2)
1.4 Aerosols, perfumes and fragrances. (K1, K2)
1.5 Pros and cons of synthetic cosmetics. (K1, K2, K3)

Unit II: (9 hours)

2.1 Safety of Cosmetics. (K1, K2)
2.2 Basic concept of cosmetic safety. (K1, K2)

2.3 Safety test items. (K1,K2,K3)
2.4 Evaluation method. (K1, K2, K3)
2.5 Skin irritation, sensitization. (K1, K2)
2.6 Testing on human (Patch test, Usage test). (K1, K2)

Unit III: (9 hours)

3.1 Herbal cosmetics. (K1, K2)
3.2 Fruits and vegetables as hair care and skin care (apple, apricot, banana, carrot, cucumber, honey, lemon, tomato). (K1, K2)
3.3 Herbal Perfumes and fragrance. (K1, K2)
3.4 Skin care herbs – olive oil, sesame oil, black pepper, Amla. (K1, K2, K3)
3.5 Aromatherapy – various oils used in aromatherapy and their significance. (K1,K2, K3)
3.6 Standardization of herbs – importance, methods employed for standardization of herbal extracts. (K1, K2)

Unit IV: (9 hours)

4.1 Dyes - definition of dyes and types. (K1, K2)
4.2 Requirements of a good dye i.e.Colour, chromophore and auxochrome, solubility, linearity, coplanarity, fastness, substantivity, definition of fastness and its properties. (K1, K2,K3)
4.3 Mordants Definition with examples. (K1, K2)
4.4 Natural dyes - Definition; Advantages and limitations of natural dyes. (K1, K2)
4.5 Examples and uses of natural dyes with respect to henna, turmeric, saffron, indigo, chlorophyll –names of the chief dyeing material/s in each of the natural dye (structures not expected) (K1, K2)
4.6 Synthetic dyes - definition of synthetic dyes, primaries and intermediates. (K1, K2)

Unit V: (9 hours)

5.1 Textile uses of dyes - impact of the textile and leather dye Industry on the environment with special emphasis on water pollution.(K1, K2, K3, K4)
5.2 Non textile uses of dyes - biomedical uses – Tablets, syrups and capsules. (K1, K2, K3, K4)
5.3 DNA markers and therapeutics. (K1, K2, K3)
5.4 Dyes in food and cosmetics - commonly used food colors and their limits. (K1, K2, K3)
5.5 Properties of dyes used in food and cosmetics. (K1, K2, K3)
5.6 Dyes sensitized solar cells – A tool to overcome the future energy crisis. (K1, K2)

Reference Books:

1. Venkatraman K, Chemistry of Synthetic Dyes, Vol I – VIII, Academic Press 1972.
2. Lubs H.A., Robert E . The Chemistry of Synthetic Dyes and Pigments, Krieger Publishing Company, NY 1995.
3. Shenai V.A., Chemistry of Dyes and Principles of Dyeing, Sevak Publications, 1973.

4. Sodhi. G. S., Fundamental Concepts of Environmental Chemistry, 3rd Edition, Narosa Publishers, 2013.
5. Kirpal Singh, Chemistry in Daily Life, 3rd Edition, Prentice Hall of India Pvt., Ltd., 2012.
6. Dr. J. C. Kurian, Plants that heal, Vol 1., P.H. Lall, Oriental Watchman Publishing House, 1995.
7. C P Khare, Indian Medicinal plants: An illustrated Dictionary, Springer Science, 2007.
8. BehlPN, Srivatsava G., Herbs useful in dermatological Therapy, 2nd Edition, CBS Publishers & Distributors, 2002.
9. H. Panda, Herbal Soaps and Detergents Handbook, NIIR project consultancy services, 2011.
10. Jayashree Ghosh, Fundamental Concepts of Applied Chemistry, 2nd Edition, S. Chand & Company Ltd., New Delhi, 2006.
11. B C Maumdar, P C Mukhopadhyay, Principles and Practice of Herbal Garden, Daya Publishing House, New Delhi, 2006.

Open Educational Resources (OER)

1. http://fsdaup.gov.in/reg-drug-and-costmetic.htm
2. https://www.theherbarie.com/The-Herbarie-Formulary.html
3. https://www.medicalnewstoday.com/articles/10884#essential_oils
4. https://www.britannica.com/technology/dye

UNEVS20: ENVIRONMENTAL STUDIES

II UG – B.A / B.Sc. / B.Com / B.B.A / BCA / BHA

SEMESTER-IV

UNEVS20– ENVIRONMENTAL STUDIES

Year/ Sem	Course Code	Title of the Course	Course Type	Course Category	H/ W	Credits	Marks
II/IV	UNEVS20	Environmental Studies	Theory	General paper	2	2	40+60=100

COURSE LEARNING OUTCOMES (CLO):

On completion of the course, the students will be able to,

1. Gain knowledge on multidisciplinary nature of Environmental studies
2. Understand the Ecosystem, its structure and function
3. Understand the conservation of Biodiversity
4. Gain knowledge on Environmental pollution, causes and its effects
5. Apply the Laws in Prevention of Environment.

UNIT I: **Multidisciplinary nature of Environmental studies: (6 hours)**
1.1 Definition, scope and importance **(K2, K3)**
1.2 Need for public awareness **(K1, K3)**
1.3 Natural resources: Renewable and non-renewable resources **(K3, K4)**
1.4 Forest Resources: Use and over-exploitation, deforestation (**K3, K4)**
1.5 Water Resources: Use and over-utilisation of surface and ground water **(K1, K2)**
1.6 Mineral Resources: Use and exploitation, environmental effects of extracting and Food resources **(K2,K3)**

UNIT II: Ecosystem: (6 hours)
2.1 Concept of an Ecosystem (**K2, K3)**
2.2 Structure and functions of an Ecosystem **(K1, K3)**
2.3 Energy flow in the ecosystem-Water cycle and carbon cycle (**K4)**
2.4 Food chain, food web and ecological pyramids **(K3)**
2.5 Structure and functions of forest and grassland ecosystem **(K2,K3)**
2.6 Structure and functions of desert and aquatic ecosystem **(K1,K3)**

UNIT III: Biodiversity and its Conservation: (6 hours)
3.1 Definition: Genetic, Species, Ecosystem Diversity (**K1, K2)**
3.2 Biogeographic classification of India (**K1, K2)**
3.3 Value of biodiversity: consumptive, productive use, social, ethical, aesthetic (**K2, K4)**
3.4 Hot spots of Biodiversity, Endangered and Endemic species of India (**K2,K3)**
3.5 Threats to Biodiversity:habitat loss, poaching of wildlife, man-wildlife conflicts(**K3, K4)**
3.6 Conservation of Biodiversity: in-situ and ex-situ (**K3, K4)**

UNIT IV: Environmental pollution:(6 hours)
4.1 Definition, causes, effects and control measures of air, water, soil and noise pollution (**K2, K3)**
4.2 Solid waste management: causes, effects and control measures of urban and industrial waste (**K2,K3)**
4.3 Climate change, global warming, (**K3)**
4.4 Acid rain, ozone layer depletion **(K3)**
4.5 Disaster management: floods, earthquakes, cyclones, landslides (**K1,K3)**
4.6 Rainwater harvesting (**K1,K2)**

UNIT V: Human Population and Environment: (6 hours)

5.1 Environmental acts- Environment Protection Act (1986), **(K1, K3)**
5.2 Air (Prevention and Control of Pollution Act 1981), Water (Prevention and Control of Pollution Act 1976 **(K2, K3)**
5.3 Wildlife Protection Act (1972), Forest Conservation Act (1980) **(K2)**
5.4 Population explosion – family welfare program **(K1,K3)**
5.5 Infectious diseases and Water related diseases **(K2, K3)**
5.6 Role of information technology in Environmental conservation. **(K1,K2)**

TEXT BOOKS:

1. Dr. V. Balu – Environmental Studies. 2004.
2. N. Arumugam – Concepts of Ecology, 2014.

REFERENCE BOOKS:

1. Verma and Agarwal – Environmental Biology, 2015.
2. Anubha Kaushik & Kaushik .C .P(2008)-Perspectives in Environmental studies (3rd Edition)New age International publishers.
3. Environmental studies, Edition: Periyar EVR college, Trichy, Jazym Publications,Trichy, 2004.

OPEN EDUCATIONAL RESOURCES (OER):

1. https://youtu.be/PwmSa09Cl6E
2. https://youtu.be/brF0RWJyx9w
3. https://youtu.be/76K_5SrYyM4
4. https://youtu.be/PqxMzKLYrZ4