DISCIPLINE SPECIFIC ELECTIVE COURSES

KU6DSECHE301: APPLIED CHEMISTRY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
VI	DSE	300	**KU6DSECHE301**	4	60

Learning Approach (Hours/ Week)		Marks Distribution			Duration of ESE (Hours)
Lecture/ Tutorial	Practical/ Internship	CE	ESE	Total	
4	0	30	70	100	2

Course Description: Fuel and Food Chemistry explores the fundamental principles and chemical processes involved in the production, transformation, and utilization of fuels and foods. This interdisciplinary course bridges the gap between chemistry, energy, and nutrition, highlighting the chemical similarities and differences between fuels and foods, their roles in society, and their environmental and health impacts.

Course Prerequisite: Elementary idea on various sources of fuels; pesticides and fertilizers

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Explain the origin of coal, coal products, petroleum products and their applications	U
2	Explain the manufacture of fertilizers, pesticides, and their applications	U
3	Understand the manufacture of glasses, cement, ceramics and the formulations of paints and varnishes	U
4	Apply the chemistry of fats and oils and explain the production of soaps and detergents.	A
5	Analyse the chemistry of food additives and explain the manufacture and refining of pulp.	An

6	Understand importance of industrial safety and industrial pollution control to apply in real world scenario.	U

Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	0	0	3	0	1	3
CO 2	0	3	0	1	3	0	3
CO 3	3	0	0	0	3	1	3
CO 4	0	1	0	3	0	0	3
CO 5	0	0	0	0	3	0	3
CO 6	0	1	0	1	0	1	3

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	UNIT	DESCRIPTION	HOURS
1	**FUEL CHEMISTRY**		**12**
	1	Coal- Origin of coal-carbonization of coal- coal gas- producer gas- water gas- coal based chemicals	
		Petroleum and Petrochemical Industry-Composition of crude petroleum-Refining and different types of petroleum products and their applications	
		Fractional Distillation-Principle and process-Cracking-Thermal and catalytic cracking.	

	2	Reforming Petroleum and non-petroleum fuels (LPG, CNG, LNG) biogas, fuels derived from biomass, Fuel from waste, synthetic fuels (gaseous and liquids), clean fuels.	

2	**FOOD & AGROCHEMISTRY**		**15**
	1	Food additives- Food flavour-food colour-food preservatives- artificial sweeteners- edible emulsifiers and edible foaming agents- uses and abuses of these substances in food and beverages	
	2	Fermentation Chemicals: Production, and purification of ethyl alcohol, citric acid, lactic acid, Vitamin B12, Penicillin	
	3	Fertilizers: Classification of fertilizers- Manufacture of ammonium salts like ammonium nitrate, ammonium sulphate and urea- Action of Ammonium sulphate and urea as fertilizers. N.P.K. Fertilizers and Natural organic fertilizers.	
	4	Pesticides: Production and applications and residual toxicity of organo-chlorine pesticides (DDT, Aldrin), organophosphates (parathion, malathion), Carbamate (carbofuran). Bio-pesticides	

3	**SILICATE INDUSTRY**		**9**
	1	Glasses: Classification and manufacture of glasses- Annealing of glass- Fiber glass, coloured glass, and optical glass	
	2	Cement: Portland cement - types, manufacture, composition and setting of cement- White cement and waterproof cement	
	3	Ceramic: Subdivisions- raw materials - manufacturing-applications	

4	**PAINTS, LUBRICANTS, ADHESIVES AND PIGMENTS**	**12**

	1	Paints: Classification, primary constituents and manufacturing of paint. Emulsion paint - constituents and advantages- Latex paints and fire-retardant paints- Solvents and thinners	
	2	Lubricants: Properties and classification- additives for lubricating oil-lubricants of mineral origin- lubricating grease and solid lubricants	
	3	Adhesives: The Process of bonding- Classification and preparation of adhesives- synthetic resin adhesives, and rubber-based adhesives, uses of adhesives	

5	**TEACHER SPECIFIC MODULE: CHEMICAL EXPLOSIVES. INDUSTRIAL SAFETY AND POLLUTION PREVENTION**	**12**
	Directions: Explosive properties of any 3 explosives, important OSHA standards regarding industrial safety, Industrial pollution prevention methods based on any industry of your area can be introduced or any other topic relevant to the course as per teachers' choice	
	Chemical explosives: Characteristic of explosives- preparation and explosive properties of Trinitro toluene- Lead azide- Nitro-glycerine- RDX. Industrial safety: OSHA-Hazard analysis and risk assessment-types of hazards in industries -risk management plan. Industrial pollution prevention: Definition of industrial waste-types of industrial waste- Industrial pollution prevention -recycling -waste treatment.	

Essential Readings:

1. B. K. Sharma: Engineering Chemistry, Goel Publishing House, Meerut

2. Industrial chemistry by B.K Sharma.

3. Industrial chemistry B.N Chakrabarthy

4. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK

5. W. D. Kingery, H. K. Bowen, D. R. Uhlmann: Introduction to Ceramics, Wiley Publishers, New Delhi

6. J. A. Kent: Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.

7. R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi.

8. P. C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi

9. Carey, D.E. Casida Industrial Microbiology.

10. Mechanism and theory in food chemistry, Dominic W.S.Wong

11. Food Science, R. Sreelakshmi

12. Mohammad Farhat Ali, Bassam M. El Ali, James G Speight, Handbook of Industrial chemistry: Organic Chemicals, Publisher: Mc-graw Hill Education

Assessment Rubrics:

Evaluation Type		**Marks**
End Semester Evaluation		**70**
Continuous Evaluation		**30**
a)	Test Paper*	12
b)	Assignment	6
c)	Seminar	6
d)	Viva-Voce	6
Total		**100**