

20PEB333E					Hydrocarbon Based Fertilizer Industries					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	--	--	100

COURSE OBJECTIVES

- Provide exposure to hydrocarbon-based fertilizer production technologies
- Provide a platform to exchange ideas on a varied range of production topics, an opportunity for active interaction with leading technology experts and workshop participants.
- Overview of the most recent hydrocarbon-based fertilizer production technologies.

UNIT 1**6 Hrs.**

Introduction to Fertilizer Industry: Definition, Types, Consumption and Uses. Role of Hydrocarbon in Fertilizer Industry. Reaction of Natural Gas in Making Fertilizer. Different type of Processes and Hydrocarbon involved in making fertilizer – Steam Reforming Process, Partial Oxidation Process, Total Recycle CO₂ Stripping Urea Process, Linde Process for manufacturing ammonia.

UNIT 2**8 Hrs.**

Different Unit Operation Involved in Fertilizer Industry Fluidized Catalytic Cracking Unit, Process Furnaces, Boilers, Incinerators, Fractionation, Towers and Columns, Ammonia Unit Secondary Reformer, Sulfur Recovery Unit.

UNIT 3**7 Hrs.**

Key Fertilizers product and process involved in multinutrients fertilizers Ammonia Plant, Urea Plant, Anhydrous Ammonia, Aqua Ammonia, Urea Ammonium Nitrate Solution, Ammonium Nitrate, Ammonium Sulfate, Calcium Nitrate, Ammoniated Phosphate, Phosphoric Acid Potassium Chlorite, Potassium Sulfate, Potassium Nitrate, Mono Potassium Sulfate;

UNIT 4**6 Hrs.**

Natural Gas Demand, Natural Gas Pricing, Environmental Impact, New Fertilizer Practices, Technological and R&D issues related to Industry, India in Fertilizer Sector, Kind of Fertilizer Used in India and Natural Gas Supply for Fertilizer Industry.

Max. 26 Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1: Understand the Indian and global scenario of Hydrocarbon based fertilizer industries and the role of Hydrocarbon
- CO2: Use reactions and unit operations steps in manufacturing of various fertilizers.
- CO3: Identify engineering problems pertaining fertilizer manufacturing.
- CO4: Select appropriate method for synthesizing fertilizer.
- CO5: Characterize product involved in multi nutrient fertilizer.
- CO6: Understand the different challenges in fertilizer industry

TEXT/REFERENCE BOOKS

1. Katja, India's Fertilizer Industry: Productivity and Energy Efficiency
2. Schumacher and Jayant Sathaye Hand book of fertilizer manufacturing process.
3. Report of the working group on fertilizer industry for the twelfth plan
4. Industry notes in key fertilizer product resources

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks: 100**

Part A/Question: <Short Notes, Problems, Numerical>

Part B/Question: <Justification, Criticism, Long answers, Interpretation >

Exam Duration: 3 Hrs

<5-7 > Marks (each)

<8-10> Marks (each)