

GUJARAT TECHNOLOGICAL UNIVERSITY
B.E. SEMESTER : VIII
ENVIRONMENTAL SCIENCE & TECHNOLOGY

Subject Name: Plant Utilities & Petroleum Refining

Subject Code: 183505

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam(E)	University Exam(P)	Mid Sem Exam(Theory) (M)	Practical (Internal)
3	0	3	6	70	30	30	20

Sr No	Course Contents
1	Identification of common plant utilities water compressed air steam vacuum refrigeration, venting flaring and pollution abating.
2	Water: Quality, storage and distribution for cooling and fire fighting.
3	Pumps and Compressors: Characteristic curves for centrifugal pumps, System curve (operating line), Net positive suction head (NPSH), cavitation, priming, Reciprocating pumps. Air-lift pump; Reciprocating and Centrifugal compressors; compressor comparison and selection. Creation of low pressure/vacuum by pumps and ejectors
4	Process Utilities: Steam generation by utilizing process waste heat using thermic fluids. Distribution of steam in a plant. Regenerators and recuperators Principles of refrigeration. Creation of low temperature using various refrigerants. Cooling water systems Flaring and venting. Different types of vents flares.
5	Principle of refining and description of major refinery units; Production of basic hydrocarbon stocks for petrochemical industry. General information on intermediate and final chemical obtainable from natural gas, naphtha etc. and their processing strategy.
6	Crude Distillation, Atmospheric Topping Unit, Vacuum distillation, TBP distillation of Petroleum fraction and Construction of property midpercent, Residue yield, distillate yield curves, Case study problem.
7	Major petroleum products and specification like LPG, gasoline, industrial solvents, naphtha, kerosene, aviation turbine fuel (ATF), high speed diesel (HSD), LDO, furnace fuels, lubricants, base oil, tar and bitumen. Blending of various petroleum fractions to meet the required specifications.
8	Types of refineries such as simple intermediate and complex, Energy and material audit. Statistical information on Indian Petroleum and Petrochemical industry, future developments, trends.

Reference Books:

1. Coulson & Richardson's Chemical Engineering Volumes 1 and 6 by J. M. Coulson and J. F. Richardson with J. R. Backhurst and J. H. Marker, Elsevier, 6th Ed., 1999
2. D. A. Wingham, Theory and practice of Heat engines, ELBS cambridge University press, 1970.
3. J. L. Threlkeld, Thermal Environmental Engineering, Prentic Hall 1970.
4. Advances in Petroleum Chemistry and Refining, Cobe and Mckette, Interscience Publishers, 1991
5. Modern Petroleum Technology, Phol and Hobson G.D, Applied Science Publishers, 1975
6. Petroleum Refining: Technology and Economics, J. H. Gary, and G. E. Handwerk, 3rd Ed, Marcel Dekker Inc. 1994
7. The chemistry and technology of Petroleum Hydrocarbon, J.H. Speight, M Dekker, 3rd Ed, 1991
8. Advanced Petroleum Refining, Khanna Publishers, G. N. Sarkar, 1998.