

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E.in Energy Engineering

Semester: I

Subject Name: **Optimum Utilization of Heat and Power**

Subject Code: **713903**

Sr. No	Course content
1.	Combined Heat and Power (CHP): Basic concepts of CHP, The benefits and problems with CHP, Balance of energy demand, Types of prime movers, Economics, CHP in various sectors.
2.	Fundamentals of Heat & Power Integration: Pinch Technology, significance, Selection of pinch temperature difference, composite curves, Stream splitting, Process retrofit, Heat Exchange Network Synthesis and it's optimization for minimum utility targets, Maximum energy recovery and minimum number of heat exchangers, Minimum Area and Operating cost, Optimum approach Temperature, Heat pumps, heat engines.
3.	Applications of Heat & Power Integration: Heat Integration of evaporators and dryers, Distillation columns, Optimum design of multistage refrigeration system, Compression Refrigeration and Adsorption Refrigeration System.
4.	Energy Losses & Waste Heat Recovery: Insulation, Sources of waste heat, Recuperative heat exchanger, Run, around coil systems, Regenerative heat exchangers, Heat pipes, Waste Heat Recovery
5	Steam Systems and Cogeneration: Steam and Power balance, Site composite curves, Cogeneration targets, Optimizing steam systems, Application & techno economics of Cogeneration, Cogeneration Performance calculations, Part load characteristics- financial considerations - Operating and Investments, Combined Cycles, Rankine Cycles, Kalina Cycle, Advantages Of Cogeneration Technology.

Reference Books:

1. Warren D. Seider, J.D. Seader, Daniel R. Lewin, "Product & Process Design Principles", 2nd edition, John Wiley & Sons, Inc.
2. Robin Smith, "Chemical Process – Design and Integration", John Wiley & Sons, Inc.

3. Biegler LT, Grossmann IE and Westerberg AW (1997), "Systematic Methods of Chemical Process Design", Prentice Hall.
4. Eastop, T.D. & Croft D.R, "Energy efficiency for engineers and Technologists", 2nd edition, Longman Harlow, 1990.
5. O'Callaghan, Paul W, "Design and Management for energy conservation", Pergamon, 1993.
6. Osborn, peter D, "Handbook of energy data and calculations including directory of products and services", Butterworths, 1980.
7. Charles H.Butler, "Cogeneration", McGraw Hill Book Co., 1984.
8. Horlock JH, Cogeneration - Heat and Power, Thermodynamics and Economics, Oxford, 1987