

### **ME 655 Energy Conservation and Waste Heat Recovery (3-0-0-6)**

Energy resources and use. Potential for energy conservation. Optimal utilization of fossil fuels. Total energy approach. Coupled cycles and combined plants. Cogeneration systems. Exergy analysis. Utilization of industrial waste heat. Properties of exhaust gas. Gas-to-gas, gas-to-liquid heat recovery systems. Recuperators and regenerators. Shell and tube heat exchangers. Spiral tube and plate heat exchangers. Waste heat boilers: various types and design aspects. Heat pipes: theory and applications in waste heat recovery. Prime movers: sources and uses of waste heat. Fluidized bed heat recovery systems. Utilization of waste heat in refrigeration, heating, ventilation and air conditioning systems. Thermoelectric system to recover waste heat. Heat pump for energy recovery. Heat recovery from incineration plants. Utilization of low grade reject heat from power plants. Need for energy storage: Thermal, electrical, magnetic and chemical storage systems. Thermo-economic optimization.

#### *References:*

- [1] J. H. Harlock, *Combined Heat and Power*, Pergaman Press, 1987
- [2] F. Kreith and R. E. West, *Energy Efficiency, CRC handbook*, CRC Press, 1999
- [3] Kays and London, *Compact Heat Exchangers*, 3rd edition, McGraw-Hill, New York.