

Subject: Fuels & Energy

Course Code CHE-333	Fuels & Energy	3CH	
		Theory+Lab (2+1)	
	Pre-req. Nil	Category	Foundation Course
Course Contents			
<u>Contents:</u> ❖ Introduction to fuels: Classification and storage of solids, liquids and gaseous fuels Characterization of fuel oil, coal and gas, storage, handling and preparation of fuels ❖ Fuel selection Criteria and characterization for the selection of fuels for industrial purposes ❖ Fuel Up gradation Carbonization, liquefaction and gasification of coal; Synthetic fuels; Petroleum refining, natural gas processing & syngas production, Fisher-tropsch process and clean coal technology ❖ Alternative resources of Energy: ➤ Introduction to ARE sources. ➤ Biomass Sources, Biomass conversion processes and technologies, Gasification and liquefaction, Kinetics of gasification. ➤ Solar energy, hydel power, wind and tidal energy, geothermal energy. ➤ Energy conservation, methodologies of selected systems. ❖ Principles of combustion Combustion of solid, liquid and gaseous fuels, mechanism and kinetics of combustion. Combustion calculation ❖ Combustion technologies ➤ Oil & Gas Burners, Fluidized Bed Combustion Boilers. Furnaces and Waste Heat Recovery: Classification, general fuel economy measures in furnaces, excess air, heat distribution, temperature control, draft control. ❖ Overview of Energy Policies: ➤ Energy conversion: Energy conversion technologies in industrial energy systems: overview of technologies and engineering thermodynamics for process utility boilers, steam turbine, gas turbine, combined heat and power (CHP). ➤ Emissions control: Greenhouse gas emissions and its consequences, energy efficiency measures in industry, Optimization of industrial Energy systems, Reduction potential for greenhouse gas emissions in industry, Carbon capture and sequestering.			
Weekly plan/ Reference Books			
1	Introduction to fuels: Classification and storage of solids, liquids and gaseous fuels Characterization of fuel oil, coal and gas, storage, handling and preparation of fuels Fuel selection Criteria and characterization for the selection of fuels for industrial purposes		
2-3	Fuel Up gradation		

	Carbonization, liquefaction and gasification of coal; Synthetic fuels; Petroleum refining, natural gas processing & syngas production, Fischer-tropsch process and clean coal technology
4	Principles of combustion Combustion of solid, liquid and gaseous fuels, mechanism and kinetics of combustion. Combustion calculation Combustion technologies Oil & Gas Burners, Fluidized Bed Combustion Boilers. Furnaces and Waste Heat Recovery: Classification, general fuel
5	Overview of Energy Policies: Energy conversion: Energy conversion technologies in industrial energy systems: overview of technologies and engineering thermodynamics for process utility boilers, steam turbine, gas turbine, combined heat and power (CHP).
6	Emissions control: Greenhouse gas emissions and its consequences, energy efficiency measures in industry
7-8	Optimization of industrial Energy systems, Reduction potential for greenhouse gas emissions in industry, Carbon capture and sequestering.
9-10	Mid Term Exams
11-12	Alternative resources of Energy: Introduction to ARE sources. Biomass Sources, Biomass conversion processes and technologies, Gasification and liquefaction, Kinetics of gasification.
13	Solar energy, hydel power, wind and tidal energy, geothermal energy.
14-16	Energy conservation, methodologies of selected systems.
17	Revision
18	End Semester Exam
TEXT AND REFERENCE BOOKS: • Turns, S. R. "An Introduction to Combustion" 2d Edition McGraw-Hill.2000. • Griffiths, J.F.& Barnard, J.A."Flame and Combustion", 3d Edition, Blackie Academic Professional.1995. • Harker J.H.,Backhurst J.R."Fuel and Energy",1981,Academic Press" • Probststein,"Synthetic Fuels",McGraw-Hill. • Marion Smith," Fuels and Combustion",McGraw-Hill.	