GUJARAT TECHNOLOGICAL UNIVERSITY
M.E.in Energy Engineering
Semester: I

Subject Name: **Fuels & Combustion Technology (Major Elective – I) (Chemical Group)**
Subject Code: **713905**

Sr. No	Course Content
1.	**Introduction** Types of fuels, Solid, liquid and gaseous fuels, Properties of fuels, Coal, liquid fuels, gaseous fuels and agro-residues, Solid Fuels Coal, Family, origin, classification of coal, Analysis and properties, Action of heat on coal, Gasification, Oxidation, Hydrogenation and liquefaction of coal, Efficient use of solid fuels.
2.	**Liquid Fuels** Origin and classification of petroleum, Refining, Properties & testing of petroleum products, Various petroleum products, Petroleum refining in India, Liquid fuels from other sources, Storage and handling of liquid fuels.
3.	**Gaseous Fuels:** Types of gaseous fuels: natural gases, methane from coal mines, manufactured gases, producer gas, water gas, biogas, refinery gas, LPG, Cleaning and purification of gaseous fuels
4.	**Manufactured fuels** Agro fuels, Solid fuel handling, Properties related to combustion, handling, and storage. Bio-Fuels: Types of Bio-fuels, Production processes and technologies, Bio fuel applications.
5	**Thermodynamics of Combustion** Stoichiometry and thermodynamics, Combustion stoichiometry, Combustion thermodynamics, Calculation of heat of Formation & Heat of Combustion, First Law analysis of reacting system, Combustion of Oil, Combustion of Coal, Combustion of Gas, Draft System, Combustion Appliances, Gas burners, Functional requirement of burners, Gas burner Classification, Stoker firing, pulverized system of firing, Fluidized bed combustion process, Combustion Controls, Heat Treatment Furnaces, Industrial furnaces, process furnaces, Kilns, Batch & continuous furnaces.
6	**Stoichiometry of combustion** Estimation of minimum amount of air required for a fuel of known composition, Theoretical & actual combustion processes - Air Fuel Ratio, Estimation of dry flue gases for known fuel composition, Calculation of the composition of fuel & excess air supplied, from exhaust gas analysis, Dew point of products, Flue gas analysis(O2,

	CO2, CO, NOx, Sox), Combustion using pure oxygen generated by Pressure Swing Adsorption(PSA).

Reference Books

1. S.P. Sharma & Chander Mohan, "Fuels & Combustion", Tata McGraw Hill Publishing Co. Ltd., 1984
2. Gupta O.P, "Elements of Fuels, Furnaces & Refractories", 3rd edition, Khanna Publishers, 1996.
3. Dr. Samir Sarkar, "Fuels & Combustion", 2nd Edition, Orient Longman, Second edition, 1990.
4. B. I Bhatt & S. B. Thakore, "Stoichiometry", 5th Edition, McGraw Hill.ss
5. James G, Chemistry and Technology of Petroleum, Marcel Dekker, NY
6. B. K. Sharma, Fuels and Petroleum Processing , 1st ed. Goel publishing, Meerut,1998
7. Blokh A.G, "Heat Transmission in Steam Boiler furnaces", Hemisphere Publishing Corpn.ISBN-089-116-626-2
8. D.O. hall & R.P. Overeed, John Willey and Sons, New York, 1987