FUELS AND COMBUSTION

Course Code: 13ME2312 **L P C**
4 0 3

Pre-requisites: Thermodynamics

Course Educational Objectives:
To make the student understand
1. solid, liquid and gaseous fuel properties, analysis, process and handling
2. stoichiometry relations
3. the combustion process
4. features of different types of burners.
5. about emissions

Course Outcomes:
The student will be able to
1. differentiate between various fuels
2. analyse exhaust and flue gases
3. understand design considerations of burners
4. control of emissions in combustion.

UNIT-I
Classification of coal, analysis and properties of coal, oxidation of coal, hydrogenation of coal, agro fuels, solid fuel handling.
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UNIT-II
Classification of petroleum products, Handling and storage of petroleum products, Refining and other conversion processes, property and testing of petroleum products, other liquid fuels.
Types of gaseous fuels, natural gases, methane from coal mines, manufactured gases, producer gas, water gas, blast furnace gas, refinery gas, LPG, cleaning and purification of gaseous fuels.

UNIT-III
Stoichiometry relations, theoretical and minimum air required for complete combustion, calculation of dry flue gases, exhaust gas analysis, flue gas analysis.

Principles of combustion, rapid methods of combustion, flame propagation, various methods of flame stabilization.

UNIT-IV

Basic features of burner, types of solid, liquid and gaseous fuel burners, design consideration of different types of burners, recuperative and regenerative burners, Pulverised fuel furnaces–fixed, entrained, and fluidized bed systems.

UNIT-V

Emissions, Emission index, corrected concentrations, control of emissions for premixed and non-premixed combustion.

TEXT BOOK:

1. S. Sarkar, "*Fuels and combustion"*, 3rd Edition, Universities Press, 2009.

REFERENCES:

1. H. Joshua Phillips, "Fuels, solid, liquid and gaseous – Their analysis and valuation", General Books, 2010.

2. S.R. Turns, "*An introduction to combustion – Concepts and applications"*, Tata McGraw- Hill, 2000.

3. K. Kanneth, "*Principles of combustion"*, Wiley and Sons, 2005.

4. S.P. Sharma and C. Mohan, "*Fuels and combustion"*, Tata McGraw-Hill, 1984