FUELS AND COMBUSTION

Course Code: 13ME2312

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Course Outcomes:

At the end of the course, the student will be able to
CO1 : Differentiate between various fuels
CO2 : Explain different steps in refinery process of petroleum
CO3 : Analyze exhaust and flue gases
CO4 : Design burners
CO5 : Explain methods for emission control 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