

OBJECTIVE

To enable the students to have a thorough knowledge about different types of fuels used in industries and the mechanism involved in converting the fuel into a useful source of energy.

OUTCOME

On completion of the course the students are expected to

- Have a complete knowledge idea about the occurrence and characteristics of the different types of solid fuels.
- Have a better knowledge about the different types of liquid fuels and their properties.
- Have a complete understanding about the different liquid fuels and their properties.
- Have a basic knowledge about the combustion process involved in the fuels.
- Have an idea about the ways of heat transfer and the different heat recovery systems.

UNIT I SOLID FUEL

Wood, charcoal, coal characteristics – formation of coal, grading of coal, handling and storage of coal, coal washing, hardness and grindability of coal, calorific value, coal analysis.

Manufacture of coke. Agro based solid fuels – wheat, rice, bagasse, solid oxide fuel cells.

UNIT II LIQUID FUEL

Origin and composition of natural oil, refining process of liquid petroleum products, synthetic liquid fuels – calorific value, storage and handling of liquid fuels. Bio fuels – importance.

UNIT III GASEOUS FUELS

Composition and calorific value – natural gas, liquefied petroleum gas, oil gas, coal gas, producer gas, water gas, other gaseous fuels. Non conventional fuels – importance, hydrogen fuel.

UNIT IV COMBUSTION PROCESS

Air requirement, combustion processes of solid, liquid, gaseous fuels, control of combustion process, combustion stoichiometry.

UNIT V HEAT TRANSFER

Heat transfer to charge by conduction, convection and radiation in a kiln, heat loss through kiln wall, opening, cooling etc., heat balance and thermal efficiency, heat recovery – recuperator and regenerator, co-generator – importance.

TEXT BOOKS

1. Samir Sarkar, Fuels and Combustion, 2nd Edn., Orient Longman, Bombay, 1990.
2. Om Prakash Gupta, Elements of Fuels, Furnaces and Refractories, Khanna Publishers, 1995.

REFERENCES

1. Wilfrid Francis and Martin C.Peter, Fuels and Fuel Technology, Pergamon Press, 1980.
2. J.P.Holman, Heat Transfer, McGraw – Hill, 1997.
3. J.D.Gilchrist, Fuels, Furnaces and Refractories, Pergamon Press, NY, 1977.
4. A.K.Shaha, Combustion Engineering and Fuel Technology, Oxford & IBH Publishing Co., New Delhi, 1974.