Fundamentals of Combustion - Web course

COURSE OUTLINE

Introduction: Introduction to combustion, Applications of combustion, Types of fuel and oxidizers, Characterization of fuel, Various combustion mode, Scope of combustion.

Thermodynamics of Combustion: Thermodynamics properties, Laws of thermodynamics, Stoichiometry, Thermo-chemistry, adiabatic temperature, chemical equilibrium.

Chemistry of Combustion: Basic Reaction Kinetics, Elementary reactions, Chain reactions, Multistep reactions, simplification of reaction mechanism, Global kinetics.

Physics of Combustion: Fundamental laws of transport phenomena, Conservations Equations, Transport in Turbulent Flow.

Premixed Flame: One dimensional combustion wave, Laminar premixed flame, Burning velocity measurement methods, Effects of chemical and physical variables on Burning velocity,
Flame extinction, Ignition, Flame stabilizations, Turbulent Premixed flame.

Diffusion Flame: Gaseous Jet diffusion flame, Liquid fuel combustion, Atomization, Spray Combustion, Solid fuel combustion.

Combustion and Environment: Atmosphere, Chemical Emission from combustion, Quantification of emission, Emission control methods.

COURSE DETAIL

Lecture	Topic/s
1	Introduction
2	Applications of combustion

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http://nptel.iitm.ac.in

Aerospace Engineering

Pre-requisites:

- Thermodynamics
- Gas dynamics

Coordinators:

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3-4	Types of Fuels and various modes of combustion, Scope of combustion
5-8	Review of basic thermodynamics: Thermodynamics properties, Laws of thermodynamics, Stoichiometry, Thermo-chemistry, adiabatic temperature, chemical equilibrium
9-14	Chemistry of Combustion: Basic Reaction Kinetics, Elementary reactions, Chain reactions, Multistep reactions, simplification of reaction mechanism, Global kinetics
14-18	Physics of Combustion: Fundamental laws of transport phenomena, Conservations Equations, Transport in Turbulent Flow
19-27	Premixed Flame: One dimensional combustion wave, Laminar premixed flame, Burning velocity measurement methods, Effects of chemical and physical variables on Burning velocity,Flame extinction, Ignition, Flame stabilizations, Turbulent Premixed flame
28-35	Diffusion Flame: Gaseous Jet diffusion flame, Liquid fuel combustion, Atomization, Spray Combustion, Solid fuel combustion
36-40	Combustion and Emission: Atmosphere, Chemical Emission from combustion, Quantification of emission, Emission control methods

References:

1. D. P. Mishra, Fundamentals of Combustion, Prentice Hall of India, New Delhi, 2008.
2. Kuo K.K. “Principles of Combustion” John Wiley and Sons, 2005.
3. Strehlow R A., “Fundamentals of combustion” McGraw Hill Book Company, 1984.