FUNDAMENTALS OF COMBUSTION

PROFESSIONAL ELECTIVE - V

VIII Semester

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A5AE53	PCC	3	0	0	3	30	70	100

COURSE OBJECTIVES:

The purpose of this subject is to provide the students with theoretical background and engineering applications.

1. To know the composition of various types of fuels and their properties
2. To understand the pollution from combustion of fuels and controlling them.
3. To understand the thermodynamic of combustion.

UNIT-I	INTRODUCTION

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

UNIT-II	THERMODYNAMICS OF COMBUSTION AND CHEMISTRY OF COMBUSTION

Thermodynamics properties, Laws of thermodynamics, Stoichiometry, Thermo chemistry, adiabatic temperature, chemical equilibrium.
Basic Reaction Kinetics, Elementary reactions, Chain reactions, Multistep reactions, simplification of reaction mechanism, Global kinetics.

UNIT-III	CHEMISTRY OF COMBUSTION AND PHYSICS OF COMBUSTION

Basic Reaction Kinetics, Elementary reactions, Chain reactions, Multistep reactions, simplification of reaction mechanism, Global kinetics**.**
Fundamental laws of transport phenomena, Conservations Equations, Transport in Turbulent Flow

UNIT-IV	PREMIXED FLAME AND DIFFUSION 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.
Gaseous Jet diffusion flame, Liquid fuel combustion, Atomization, Spray Combustion, Solid fuel combustion.

UNIT-V	COMBUSTION AND ENVIRONMENT

Atmosphere, Chemical Emission from combustion, Quantification of emission, Emission control methods.

Text Books:

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

Reference Books:

1. Warnatz J, Combustion: Physical and Chemical Fundamentals, Modelling and Simulation, Experiments, Pollutant Formation, Springer Verlag, 1996.
2. Mishra D P, Fundamental of Combustion, PHI Learning, 2008.

COURSE OUTCOMES:

1.Explain the thermodynamics of combustion and analyse the composition of various types of fuels and their properties.
2. Discuss the fundamental thermodynamics of combustion and basic kinetics of various rections
3. Discuss the fundamental physical and chemical principles of various combustion phenomena independent of an application
4. Address premixed flame and diffusion by extending the earlier-gained knowledge of thermodynamics.
5. Make quantitative and qualitative estimates of characteristics of various combustion processes and its impact on environment