GUJARAT TECHNOLOGICAL UNIVERSITY

MECHANICAL (I.C. ENGINE & AUTOMOBILE ENGINEERING) (11)

COMBUSTION ENGINEERING
Sujbect Code: 3711105
SEMESTER: I

Type of course: Advanced

Prerequisite: -Elementary knowledge of Thermodynamics and IC engines

Rationale: The subject focuses at imparting knowledge and skills regarding various combustion phenomena, Fundamentals of combustion kinetics, Combustion of liquid fuel droplet & solid fuels and combustion chambers of IC engines.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE(E)	PA (M)	PA (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1.	**Unit 1: Combustion thermodynamics;** Stoichiometry; first and second laws of thermodynamics applied to combustion; Ignition and combustion in SI engine; Flame travel; turbulent flame propagation; flame stabilization; vaporization; Review of detonation and Diesel knock; effect of various factors; Combustion chambers for SI engines; Combustion in CI engine; Ignition delay and diesel knock; Excess air supply and air motion; Combustion chamber for CI engines-Construction and Performance aspects; M-combustion chamber; latest combustion chamber and technology.	15	30
2.	**Unit 2: Fundamentals of combustion kinetics:** Combustion products in equilibrium; rate of reactions; chain reactions; opposing reactions; consecutive reactions, competitive reactions; Conservation equation for multi component reacting systems.	9	20
3.	**Unit 3: Combustion of liquid fuel droplet;** Fuel atomization; types of injectors; spray formation and characteristics; Oil – fired furnace combustion; gas turbine spray combustion; direct injection engine combustion; detonation of liquid gaseous mixture.	9	25
4	**Unit 4: Combustion of solid fuels;** Coal combustion; combustion of pulverized coal; combustion of coal on bed in a fluidised bed and in a cyclone burners; stabilization of pulverized coal combustion; design consideration of coal burners; combustion generated pollution.	9	25

Reference Books:

1. Combustion Engineering – Gary L. Borman, Kenneth W. Ragland, McGraw Hill
2. Principles of Combustion – Kenneth K. Kuo, John Wiley & Sons
3. Fuels & Combustion – S. P. Sharma & Chander Mohan, Tata McGraw Hill
4. Fuels & Combustion - Sarkar
5. Introduction to combustion phenomenon, Kanury murty, Mc-Ggraw hill
6. Combustion, fundamentals, strehlow, Mc-Ggraw hill

Course Outcome:

After successful completion of the course, student will be able to:

1. Apply the fundamentals of combustion phenomenon
2. Apply the principles of combustion kinetics
3. Review the concepts of combustion of liquid fuels
4. Analyse and apply the fundamentals combustion of liquid fuels
5. Review the concepts of combustion of solid fuels
6. Analyse and apply the fundamentals combustion of solid fuels