M.E Semester: 1 M.E Mechanical (Automobile Engineering)
Subject Name: Combustion Engineering (Elective-I) MEA105A

A. **Course Objective**

- To present a problem oriented in depth knowledge of Combustion Engineering
- To address the underlying concepts and methods behind Combustion Engineering

B. **Teaching / Examination Scheme**

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
CODE	NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
MEA105A	Combustion Engineering	3	0	0	3	3	3	70	30	20	0	120

C. **Detailed Syllabus**

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
2. 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
3. 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.
4. 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.
5. 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.

D. **Lesson Planning**

SR.NO	DATE/WEEK	UNIT NO	%WEITAGE	TOPIC NO
1	1^{ST} , 2^{ND} , 3^{RD}	1	20	1
2	4^{TH} ,5^{TH} , 6^{TH}	2	20	2
3	7^{TH} ,8^{TH} , 9^{TH}	3	20	3
4	10^{TH} ,11^{TH} , 12^{TH}	4	20	4
5	13^{TH} ,14^{TH} , 15^{TH}	5	20	5

E. **Method & Pedagogy**

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed.
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

F. **Students Learning Outcomes**

- The student can identify different areas of combustion engineering.
- Can find the applications of all the areas in day to day life.

G. **Recommended Study Materials**

- **Text & 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