ME408 Combustion Generated Pollution										
L	**T**	**P**	Credit	Area		**CWS**	**PRS**	**MTE**	**ETE**	**PRE**
3	0/1	2/0	4	DEC/GEC		15/25	25	20/25	40/50	-

Objective: To familiarize the students alternative fuels for IC engines, emissions and air pollution and Exhaust treatment devices. To impart in-depth knowledge about Thermal reactors and Gas chromatography.

Syllabus		**Contact Hours**
Unit-1	Engine fundamentals: Fuels, alternative fuels for IC engines, Type of hydro carbons. Gasoline specifications. Effect of Engine parameters on performance, fuel injection for SI engines, Engine vehicle road performance, road performance and fuel economy.	**6**
Unit-2	Emissions and air pollution: Automotive Emissions and their role in air pollution. Photo chemical smog. Chemistry of smog formation. Combustion in Homogeneous mixtures, emission formation. incomplete combustion, formation of hydro carbons, Carbon monoxide and oxides of nitrogen. Aldehyde emissions.	6
Unit-3	Influence of design and operating variables on gasoline engine exhaust emissions. Hydrocarbon Evaporative Emissions: Various sources and methods of their control. Canisters for controlling evaporative emissions. Emission control systems for gasoline engines: Blow by control closed PCV system design.	8
Unit-4	Exhaust treatment devices: Air injection into exhaust system.	8
Unit-5	Thermal reactors, Catalytic convertor. Stratified charge engines. Honda CVCC engine. Diesel engine combustion Emissions: Sources of emissions during combustion. Effect of air fuel ratio, speed, injection timing on performance and emission formation. D.I. and I.D.I engine emissions.	6
Unit-6	Methods of reducingg emissions, exhaust gas recirculation, smoke emission from diesel engines. Emission Instruments: Non- dispersive Infrared analyzer, Gas chromatography, flame ionization detector, Chemiluminescent analyser.	**8**
	Total	**42**

Reference Book:	
1	Combustion generated air pollution, Earnest S Starkman, Springer, ISBN-9780306305302.
2	Fundamentals of Air pollution engineering, Richard C. Hagan, Prentice Hall, ISBN-0133325371.
3	Air pollution threat & response, David Alym, Addison-Wesley Publication, ISBN-0201043556.

Course Outcomes

CO1	Recognise the ongoing role of combustion, both of fossil and bio-fuels, in providing a more sustainable energy source for society, and the environmental challenges
CO2	Summarise the mechanisms of combustion generated air pollution and the techniques
CO3	Measurements, modelling and scaling in understanding combustion
CO4	Recognise the safety and handling issues associated with combustion;
CO5	Explain the responsibility of engineers to the community in terms of providing a safe healthy environment
CO6	Controlling techniques to lower emissions.

CO-PO/PSO Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	2	2	1	1	1	1	2	2	1	3
CO2	3	3	2	2	2	2	2	1	1	1	1	3	3	2	2
CO3	3	3	3	2	2	2	1	1	1	1	1	2	2	1	3
CO4	3	3	3	3	2	2	2	1	1	1	1	2	3	1	2
CO5	3	3	3	3	3	2	2	1	1	1	1	3	3	2	3
CO6	3	3	3	3	3	2	2	2	1	1	1	2	3	2	3