

**B.E Semester: VII**  
**Automobile Engineering**  
**Subject Name: Automobile pollution and control (AE 702)**

**Course Objective:**

- To present a problem oriented in depth knowledge of automobile pollution and control.
- To address the underlying concepts and methods behind automobile pollution and control.

**Teaching / Examination Scheme:**

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVA	
CODE	NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
AE702	Automobile pollution and control	3	0	2	5	4	3	70	30	20	30	150

**Detailed Syllabus:**

Topic no	Details
1.	<b>Introduction</b> Vehicle population assessment in metropolitan cities and contribution to pollution, effects on human health and environment, global warming, types of emission, transient operational effects on pollution, noise vibration and harshness (NVH).
2.	<b>Pollutant Formation in Engines</b> Pollutant formation in SI Engine, mechanism of HC , CO and NO in SI engine, exhaust emission and factors affecting the emission, evaporative emission, crankcase emission, lead emission CI engine emissions: formation of smoke, factors affecting the smoke formation, diesel odour, unburned hydrocarbons, carbon monoxide, oxides of nitrogen, smog and comparison of diesel and petrol emissions. Two stroke engine pollution.
3.	<b>Control of Emissions from Engines</b> Design strategies to control emission from engines, effect of design and operating parameters on emission concentrations, modification in the engine design, modifying the fuel used, exhaust gas treatment devices, crankcase emission control, evaporative emission control, exhaust emission control, air injection system, second generation air injection system, spark timing emission control system, thermal reactor package, catalytic convertor package, NOx emission control, control of smoke, odour control, and pollution from gas turbine and its control.
4.	<b>Noise Pollution from Automobiles</b> Noise, Vibration And Harshness, Sources of Noise, Measurement of Noise -Engine combustion noise, Inlet And Exhaust Noise, Traffic Noise, Vehicle Body Noise - control of noise, control devices and noise proof materials
5.	<b>Measurement Techniques Emission Standards and Test Procedure</b> NDIR,FID, Chemiluminescent analyzers, Gas Chromatograph, smoke meters, emission standards, driving cycles – USA, Japan, Euro and India. Test procedures – ECE, FTP Tests. SHED Test –

chassis dynamometers, dilution tunnels.
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**Lesson Planning:**

Sr. No.	Date/Week	Unit No.	% Weightage	Topic No
1	1 <sup>st</sup> , 2 <sup>ed</sup> , 3 <sup>ed</sup>	Unit 1	20 % .	1
2	4 <sup>th</sup> , 5 <sup>th</sup> , 6 <sup>th</sup>	Unit 2	20 %	2
3	7 <sup>th</sup> , 8 <sup>th</sup> , 9 <sup>th</sup>	Unit 3	20 %	3
4	10 <sup>th</sup> , 11 <sup>th</sup> , 12 <sup>th</sup>	Unit 4	20 %	4
5	13 <sup>th</sup> , 14 <sup>th</sup> , 15 <sup>th</sup>	Unit 5	20 %	5

**Instructional 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.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.
  - Emission standards.
  - An experiment on SI engine emissions.
  - An experiment on CI engine emissions.
  - An experiment on Measurement of HC, CO, CO<sub>2</sub>, O<sub>2</sub> using exhaust gas analyzer for SI engine.
  - An experiment on Measurement of HC, CO, CO<sub>2</sub>, O<sub>2</sub> using exhaust gas analyzer for CI engine.
  - Diesel smoke measurement.
  - An experiment on of NDIR Gas Analyser and FID.
  - An experiment on Chemiluminescence NO<sub>x</sub> analyzer.

Practical / Oral: The candidate shall be examined on the basis of term-work.

### Students Learning Outcomes

- The student can identify different areas of automobile pollution and control.
- Can find the applications of all the areas in day to day life.

### Recommended Study Materials

#### **Text & Reference Books:**

- Paul Degobert – Automobiles and Pollution – SAE International ISBN-1-56091-563- 3, 1991.
- Ganesan, V- “Internal Combustion Engines”- Tata McGraw-Hill Co.- 2003.
- Beranek.L.L. “ Noise Reduction”, McGraw Hill Book co., Inc, New York, 1993.
- SAE Transactions- “Vehicle Emission”- 1982 (3 volumes).
- Obert.E.F.- “Internal Combustion Engines”- 1988
- Marco Nute- “ Emissions from two stroke engines, SAE Publication – 1998.
- Internal combustion engine by domkundwar.

