

19AE401

AUTOMOTIVE EMISSIONS AND CONTROL



Hours Per Week :

L	T	P	C
3	0	2	4

Total Hours :

L	T	P	CS	W/RA	SSH	SA	S	BS
45	-	30	-	5	30	20	5	5

Source :

<http://www.bosal.com>

COURSE DESCRIPTION AND OBJECTIVES:

This course provides an introduction to the vehicle population growth, types of emission, formation of pollutant in SI and CI engine, effect of pollutant on human health, environment, measurement and control.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Describe the emission and its effect on human health and environment.	10
2	Identify the formation of pollutant in SI engine.	2,6
3	Identify the formation of pollutant in CI engine	3,9,10
4	Apply the Emission control techniques to test procedures	4,12
5	Analyze the Emission measurement techniques, Emission Standards and various test procedure	5,10

SKILLS:

- ✓ Identify types of Emissions and its effects
- ✓ HC, CO & NOX Formation in S.I Engine
- ✓ Smoke & particulate Formation in CI Engine
- ✓ Emission control techniques using EGR, CC & SCR
- ✓ Various types of Emission norms (or) standard follows

UNIT - I	L-9
SURVEY ON VEHICLE POPULATION: Vehicle population assessment in metropolitan cities and contribution to pollution, effects on human health and environment, global warming, Green house effect, types of emission (controlled and uncontrolled emissions), transient operational effects on pollution.	
UNIT - II	L-9
POLLUTANT FORMATION IN SI ENGINES : Pollutant formation in SI Engines, mechanism of HC and CO formation in four stroke and two stroke SI engines, NOx formation in SI engines, effects of design and operating variables on emission formation, evaporative emission. Two stroke engine pollution.	
UNIT - III	L-9
POLLUTANT FORMATION IN CI ENGINES : Pollutant formation in CI engines, smoke and particulate emissions in CI engines, effects of design and operating variables on CI engine emissions, NOx formation.	
UNIT - IV	L-9
CONTROL OF EMISSIONS FROM SI AND CI ENGINES : Design of engine, optimum selection of operating variables for control of emissions, EGR, catalytic converters, catalysts, fuel modifications, two stroke engine pollution controls. SCR, lean NOx trap and DPF, PCV, Fuel charcoal canister.	
UNIT V	L-9
MEASUREMENT TECHNIQUES EMISSION STANDARDS : 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.	

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS	TOTAL HOURS:30
<ol style="list-style-type: none"> 1. Measurement of HC using gas analyzer. 2. Measurement of CO from SI Engine by using gas Analyzer. 3. Measurement of CO from CI Engine by using gas Analyzer. 4. Measurement of NOX from CI Engine. 5. Measurement of NOX from SI Engine. 6. Study of SCR. 7. Experiment on Dilution tunnel. 8. Measurement of Smoke from CI engine by using smoke meter. 9. Engine Vibration measurement by using vibrometer. 10. Performance and Emission testing of SI Engine by using two wheeler chassis dynamometer. 	

TEXT BOOKS :

1. Paul Degobert – Automobiles and Pollution – SAE International SBN-1-56091-563-3, 1991.
2. G.P.Springer and D.J.Patterson, Engine Emissions, Pollutant formation, Plenum Press, New York, 1986.
3. D.J.Patterson and N.A.Henin, 'Emission from Combustion Engine and their control', Anna Arbor Science Publication, 1985.

REFERENCE BOOKS :

1. SAE Transactions- "Vehicle Emission"- 1982 (3 volumes).
2. Obert.E.F.- "Internal Combustion Engines"- 1988
3. Marco Nute- " Emissions from two stroke engines, SAE Publication – 1998
4. Ganesan .V- "Internal Combustion Engines"- Tata McGraw-Hill Co- 2003.