

Course code	Course Name	L-T-P – Credits	Year of Introduction
AU365	AUTOMOTIVE POLLUTION AND TESTING	3-0-0-3	2016
Prerequisite : Nil			
Course Objectives <ul style="list-style-type: none"> To impart the basic concepts of IC Engine pollution and its effects To know about pollution sources and pollution control To discuss methods of measuring automotive pollution 			
Syllabus Emission standards & regulations -Emission measurement and testing procedures-Mechanism of pollutant formation -Formation of HC -Technology for controlling emissions -Controlling emission -inspection frequency and roadside inspection			
Expected outcome. <ul style="list-style-type: none"> The students will know about various emissions of automotive engines and the emission testing methods. 			
Text Book: <ol style="list-style-type: none"> Asil Faiz, C S Weaver, M P Walsh, Air pollution from motor vehicles, The World bank , Washington D C, 1996 Paul Degobert, Automobiles and pollution — Editions Technip, 1995 			
Reference Books <ol style="list-style-type: none"> James D. Halderman, James Linder, <i>Automotive Fuel and Emissions Control Systems</i>, 3/e Pearson, 2012 Springer and Patterson, <i>Engine Emission</i>, Plenum Press, 1990 W.M. Crouse and A.L. Anglinm, <i>Automotive emission control</i>, McGraw Hill Co., NewYork, 1993 			
Course Plan			
Module	Contents	Hours	Sem. Exam Marks
I	Emission standards & regulations – international standards, US, European union standards, & Indian standards. Compliance with standards – certification - assembly lane testing – In use surveillance & recall. Emission measurement and testing procedures – light and heavy duty vehicles & two wheelers. Crankcase, evaporative, refueling and on-road emissions. NDIR analyzers, FID, Chemiluminescence analyzers etc..	7	15%
II	Mechanism of pollutant formation – formation of NO _x & CO in SI and CI engines – formation of particles in SI and CI engines – oxidation of soot – role of soot inhibitors Formation of HC – aldehydes, ketons, alcohols and organic acids - formation of HC in SI and diesel engines.	7	15%
FIRST INTERNAL EXAMINATION			
III	Technology for controlling emissions – Gasoline fueled vehicles – A/F ratio, electronic control. Catalytic convertors – two way and three way convertors – catalytic wear and poisoning. Diesel fueled	7	15%

	vehicles – engine design – exhaust after treatment – EGR- Crankcase emission and control - evaporative emission and control – fuel dispensing and distribution emissions and control.		
IV	Emission standards for inspection and maintenance – cost and benefits – emission improvements – impact of tampering – cost effectiveness. Remote sensing of vehicle emissions – evaluation of data. Vehicle replacement and retrofit programs – scrapage and relocation – replacement – retrofit program. Intelligent vehicle-highway systems	7	15%
SECOND INTERNAL EXAMINATION			
V	Controlling emission - inspection procedures for SI engines – exhaust & evaporative emissions – motorcycle white smoke. Institutional setting for inspection and maintenance – centralized and decentralized I/M – comparison – inspection frequency and roadside inspection	7	20%
VI	Influence of fuel:- Gasoline fuel – density, volatility, octane number, additives, mis-fueling. Diesel fuel – cetane number, sulphur and aromatics, additives – metallic, organic and water. Alternative fuels – NG, LPG, Alcohols-methanol and ethanol, Biodiesels and their blends, Hydrogen, Low and high content oxygenated fuels. Effect of lubricants – influence of large scale use of alternative fuels.	7	20%
END SEMESTER EXAM			

Question Paper Pattern

Maximum marks: 100

Time: 3 hours

The question paper shall consist of three parts

Part A

4 questions uniformly covering modules I and II. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B

4 questions uniformly covering modules III and IV. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C

6 questions uniformly covering modules V and VI. Each question carries 10 marks
Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: In all parts, each question can have a maximum of four sub questions, if needed