

GUJARAT TECHNOLOGICAL UNIVERSITY

MECHANICAL (I.C. ENGINE & AUTOMOBILE ENGINEERING) (11)

AUTOMOBILE MAINTENANCE AND POLLUTION CONTROL

SUBJECT CODE: 2721106

SEMESTER: II

Type of course: Advanced/ Application

Prerequisite: - Fundamentals of I.C. Engines & Automobile Engineering at under graduate level

Rationale: Concern in Automobile maintenance is a good intention to control pollution at preliminary stage in automotive industries. Automobiles exhaust emissions, which pollutes the atmosphere and Increase in number of automobiles day by day have resulted in atmospheric pollution beyond permissible limits. Thus automobile emissions have become a socioeconomic concern for all. Emission standards are therefore set in every country to control this problem. These standards specify maximum amount of pollutants that can be released into the environment by different types of vehicles. The PG students should therefore have thorough knowledge about Automobile Maintenance and Pollution Control. This course will provide knowledge about maintenance, reasons for automobile pollutants and means to reduce them.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks		Practical Marks				
			ESE (E)	PA (M)	PA (V)		PA (I)			
					ESE	OEP	PA	RP		
3	2#	2	5	70	30	20	10	10	10	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Unit-I Engine Maintenance: Engine troubles, effects & remedies, different major & minor services for engine, inspection and checking of components visually and dimensionally, reconditioning methods of engine components, engine tune-up, special tools & advanced equipments.	8	19
2	Unit-II Chassis Dive-line Maintenance: Maintenance, repair and servicing of clutches, Fluid flywheel, gear boxes, Automatic transmission ,CVT unit, propeller shaft, differential unit, front axle and rear axle, suspension systems, servicing of brake systems- hydraulic, air systems, brake bleeding and brakes adjustments, maintenance and servicing of steering system-Manual & Power Steering system, wheel balancing, wheel alignment, maintenance of tyres, tyre rotation, frame defects, chassis frame alignment.	9	22
3	Unit-III Maintenance, servicing of auxiliaries: Cooling system service, anti corrosion additives, anti freezing solutions, dry & wet liners, Petrol fuel and diesel fuel system maintenance, MPFI maintenance, lubrication system services, Chassis lubrication, lubrication chart, maintenance and care of storage batteries, battery testing methods, maintenance of ignition systems, tyre service & reconditioning.	8	19
4	Unit-IV Air Pollution due to Automobile Exhaust : Sources of Emission, Exhaust gas constituents & analysis, Ingredients responsible for air	8	19

	pollution, Smoke , odor, Smog formation, Sources of pollution, effects, Analysis of air pollutants, Air pollution control models and equipments.		
5	Unit-V Exhaust Emission Control: Basic method of emission control, catalytic converter, After burners, reactor manifold, air injection, crank case emission control, evaporative loss control, Exhaust gas recirculation, Fuel additives. Pollution Norms : European pollution norms, Indian pollution norms as per Central Motor Vehicle Rules (C.M.V.R.).Characteristics of solid waste, Potential methods of solid waste disposal, Energy recovery from municipal and Industrial solid waste.	9	21

Reference Books:

1. Mechanics of Road Vehicles – W. Steed, Illefe Books Ltd. London
2. Automotive Chassis – P. M. Heldt, Chilton Co. NK
3. I. C. Engine – Litchy
4. I. C. Engine – Obert
5. Introduction to Internal Combustion Engines”, Richard Stone, McMillan, London
6. Vehicle and Engine Technology – Hein Heister
7. Advance Vehicle Technology - Hein Heister
8. S. I. Engine – Fuel Injection Development - Charles A. Fisher, Chapman & Hall
9. Automotive Engines - Herbert E. Ellinger
10. Automobile Engg. Volume – I - American Technical Society, Chicago
11. Internal Combustion Engines Fundamentals – John B. Heyhood, McGraw Hill
12. Environmental Engineering, H.S.Peavy, D.R.Rowe, G.Tchobanoglous, McGraw-Hill Book Company, New York.
13. Introduction to Environmental Engineering and Science, G. Masters, Prentice-Hall International Editions.
14. Environmental Considerations in Energy Development, Asian Development Bank (ADB) Manila.

Course Learning Outcome:

After successful completion of the course, student will be able to:

- Understand the basic concept of engine maintenance.
- Understand the Chassis Dive-line Maintenance
- Understand the Maintenance and servicing of auxiliaries
- Understand concept of Air Pollution due to Automobile Exhaust and its control methods.
- Understand Exhaust Emission Control

List of Experiments:

1. Study of Garage layouts, Workshop management and Automotive service equipments.
2. Cleaning and Testing of a Petrol Injector on MPFI test bench.
3. Overhauling of Carburetor and Gearbox.
4. Study working principle and perform operation of (a) Four post hoist (b)Electronic air inflator (c) Tyre changer (d) Car Washer.
5. Inspection and service of an Air conditioning system of a car using AC recovery unit and UV leak detector.

6. Performance & emission test on Heavy duty diesel engine (transient Dyno)
7. Study of Emission test for SI Engine (i) 2 wheelers (ii) 3 wheelers (iii) 4 wheelers on Chassis Dynamometer.
8. Performance & emission test on CNG engines.
9. To study Noise reduction in muffler.

Open Ended Problems:

Necessary steps for Service procedure and Maintenance schedule chart for service of any car from any reputed service stations.

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.