

M.E Semester: 1 M.E Mechanical (Automobile Engineering)
Subject Name: Automobile maintenance and pollution control MEA104

A. Course Objective:

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

B. Teaching / Examination Scheme

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY	IE	CIA	PR. / VIVO		
CODE	NAME	Hrs	Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks		
MEA104	Automobile maintenance and pollution control	4	0	2	6	5	3	70	30	20	30	150

C. Detailed Syllabus

1. 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.
2. 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.
3. 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.

4. Air Pollution due to Automobile Exhaust : Sources of Emission, Exhaust gas constituents & analysis, Ingredients responsible for air pollution, Smoke, odor, Smog formation, Sources of pollution, effects, Analysis of air pollutants, Air pollution control models and equipments.
5. 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.

D. **Lesson Planning**

<u>SR.NO</u>	<u>DATE/WEEK</u>	<u>UNIT NO</u>	<u>%WEITAGE</u>	<u>TOPIC NO</u>
1	1 ST , 2 ND , 3 RD	1	20	1
2	4 TH , 5 TH , 6 TH	2	20	2
3	7 TH , 8 TH , 9 TH	3	20	3
4	10 TH , 11 TH , 12 TH	4	20	4
5	13 TH , 14 TH , 15 TH	5	20	5

E. **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.

List of experiments:

1. Remove multi-cylinder engine from a vehicle, dismantle, clean, inspect and repair following components
 - i. cylinder head for warpage and cracks, refacing by grinding or cutting, straightening cylinder heads
 - ii. Cylinder block for measurement of ovality and taperedness , cylinder boring , honing process, changing of liners.
 - iii. Piston and piston rings for wear, appearance, piston head for signs of deposits and detonation, oversize piston, ring groove clearance, removing and refitting rings.
2. Tuning of carburetor, tuning and maintenance of diesel fuel injection system.
3. Servicing lubrication system – change oil filter, check oil pump, diagnose causes for excessive oil consumption, external oil leakage, and low oil pressure in an automobile engine.
4. Overhauling of clutch and gear box- dismantling, inspection of clutch and gearbox parts – pressure plate, clutch plate, gear shaft bearing, synchromesh unit, shifting ring forks etc. repairing, replacement of components and reassembling of the clutch and gear box, adjustment of shifting mechanism. Adjust the clutch paddle.
5. Dismantle the propeller shaft and differential, Check wear in universal joints, straightness in propeller shaft, remove bushes and bearings and reassemble it. Check the differential gears for wear, run out, backlash, tooth contact. Adjust the final drive and obtain even tooth contact.
6. Adjustment of mechanical and hydraulic brakes and renewal of brake liners, repairing of master cylinder, wheel cylinder, brake chamber, brake bleeding, skinning scored brake drum.
7. To remove and refit the drag link and steering gearbox. Adjust joints and track rod ends. Do the Adjustment of steering gear to take up backlash.
8. Evacuation, charging and trouble shooting of Air conditioner.

F. **Students Learning Outcomes**

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

G. **Recommended Study Materials**

• **Text & 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.

