

32173 – AUTOMOBILE MAINTENANCE AND EMISSION CONTROL

DETAILED SYLLABUS

UNIT-I INTRODUCTION TO AUTOMOBILE WORKSHOP & MAINTENANCE MANAGEMENT

General shop safety- shop layout, shop safety rules and procedures, shop hazards and its control. General shop tools- wrenches, ratchets, sockets, screw drivers, pliers, hammers, mallets, punches, chisels, files, taps, dies, gear & bearing pullers, bushing & seal pullers and drivers. Shop equipments- Blow gun, bench grinder, trouble light, hydraulic press, floor jack, safety stands, vehicle lift, tire changer, circuit tester, multimeter, tachometer & volt-amp tester. Measuring instruments- Rules, feeler gauges, wire gauge, micrometers, outside micrometer, dial indicator, vernier caliper, depth gauge, pressure & vacuum gauges. Necessity of maintenance, types of maintenance- preventive maintenance system, scheduled maintenance system & breakdown maintenance system, General maintenance schedule- daily, weekly, monthly & periodic maintenance of various vehicles (2 wheelers, LMV & HMV). General automotive service procedure, maintenance of records, log sheets & other documents used in automobile workshops.

UNIT- II ENGINE MAINTENANCE- REPAIR & OVERHAULING

Dismantling of engine components, cleaning methods, visual & dimensional inspection, servicing of cylinder head-checking for warpage, cracks, refacing by grinding or cutting, straightening cylinder head, servicing of cylinder block- measurement of ovality, taperedness, cylinder boring, honing process & changing of liners. Servicing of piston-piston & piston rings for wear, appearance, piston head for sign deposits & detonation, oversize piston, piston ring groove clearance, removal and fitting of rings, servicing of valves- valve failure, valve refacing, service of valve seat, valve seating pattern, lapping of valves, valve clearance & adjustments. Servicing of crankshafts & connecting rod, Engine tune-up & engine assembly.

UNIT- III CHASSIS MAINTENANCE-REPAIR & OVERHAULING

Procedure for overhauling of clutch assembly, inspection & servicing of clutch components, clutch adjustments, checking clutch pedal free travel, trouble shooting of clutch. Servicing of gear box- checking for run out of main shaft & lay shaft, wear of synchroniser and worn bearing, checking oil seals & trouble shooting of gear box. 14 Curriculum Development Centre, DOTE. Page 120 Servicing of differential- repair procedure, checking & adjustment for ring gear run out, backlash in ring gear, tooth contact between ring gear & pinion, bearing pre load.

Servicing and maintenance of braking system- inspection & repair of master cylinders, wheel cylinders, brake drum, brake discs, brake lining & brake pads, adjustment of hydraulic brakes- shoe clearance, brake pedal free travel, pedal to wall clearance, parking brake adjustment. Maintenance of steering & suspension systems Care of wheels, tires, retreading of tires, vulcanizing & tire rotation, procedure of computerised wheel alignment and wheel balancing.

UNIT- IV MAINTENANCE OF FUEL SYSTEM, COOLING SYSTEMS, LUBRICATION SYSTEM

Servicing of fuel system- visual inspection, checking & cleaning fuel injectors, air cleaner service, fuel filter service, electrical fuel pump service, fuel line service, fuel gauge service, calibration & pressure setting of fuel pumps & injectors. Maintenance of cooling system- pressure checking of cooling system, cooling system flushing, water pump service, radiator service, thermostat testing, anti corrosion & anti freeze solutions. Maintenance of lubrication system- checking oil level, changing engine oil, oil filter service, oil pan service, oil pump service & oil pressure testing.

UNIT- V ENGINE EMISSIONS AND ITS CONTROL

Various emissions from Automobiles – formation & effects of pollutants on environment and human beings – Emission formation in SI engines – carbon monoxide – un burnt hydrocarbon – Nitric oxide – Lead particulate – Poly nuclear aromatic hydrocarbon emissions – Emission from C.I Engine – physical delay, chemical delay – significance – emission formation due to incomplete combustion – White, Blue and Black smokes – particulates – Noise pollution. Emission norms – EURO and INDIA, Controlling of pollutants from engine – catalytic converters, evaporative emission control, positive crank case ventilation system, EGR (Exhaust gas recirculation), Air injection, Exhaust gas analyser and Smoke meter.

Text Books

1. Automotive technology- service & maintenance by Don Knowles
2. Automotive service by Tim Gills, Delmar Publisher Inc.
3. Automotive mechanics by William H Course & Donald L Anglin.

Reference Books

1. Advanced Engine Performance Diagnosis, James D Halderman, PHI - 1998.
2. Service Manuals from Different Vehicle Manufacturers.