4054 - AUTOMOBILE ENGINES - I

Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)			
Lectures	Practical	Credits			Theory		Practical Ex.	Total
3	2	5	25	25	3 Hrs	100	-	150

Pre-requisite	Source
Nil	AUT

Semester	Theory	Test	Total	TW	PR	Gr Total
	75	25	100	50	—	150

Rationale: This course forms an essential requirement for any student intending to pursue a career in the field of Automobiles. Though it is restricted to the aspects of knowledge of Automobile Engine details, without including any coverage of the Automobile Chassis or Drive Systems, it does include all the necessary inputs taking into consideration the actual job requirements of a technician in an automobile industry. This course also has a provision for laboratory work, which is so designed so as to develop the desired abilities skills and attitudes in the students.

The course content is designed and aims at achieving the following objectives:-

To understand the basic working principles of Internal combustion engines.

To know the characteristics, properties and applications of different types of fuels used in I. C. Engines.

To know the constructional features of 2-stroke petrol and Diesel Engines.

To know the mechanics of operation & constructional features of different systems in automobiles engines.

To be able to assess the performance characteristic of different engines

To be able to determine the engine power and fuel consumption in different situations

COURSE CONTENTS	Hrs	Mks
1. THEORY OF AUTO ENGINES	4	10
Introduction to I.C. Engines. Classification, Nomenclature & Compression ratio. Working principles of I. C. Engines: Two stroke & four stroke S.I. & C. I engines. Study of Otto, Diesel and Dual (Ideal) cycles and blotting on P.V. & T.S. diagrams. Comparison of SI and CI Engines. Comparison of 2 stroke and 4 stroke IC Engines. Scavenging Methods in 2 stroke IC engines: a) Crankcase scavenged engine		
2. ENGINE PERFORMANCE & TESTING	5	12
Calculation of MEP, I.P., B.P. F.P, Mechanical and thermal and volumetric Efficiencies; Specific fuel consumption; Relative Efficiency formulas of Otto and Diesel cycles. Mechanical, Electrical & Hydraulic dynamometers. Engine Performance curves.		
3. CONSTRUCTIONAL FEATURES OF ENGINE COMPONENTS	8	12
Constructional features and functions of cylinder block, cylinder head, oil pan, cylinder liners, piston, piston slap, piston pin, piston rings and their shapes, connecting rod, crank shaft, camshaft, flywheel, vibration damper.		
Timing gears, timing chain, timing belts. Valves and valve timing. Inlet and exhaust manifolds. Mufflers – different types		
4. FUELS FOR AUTO-ENGINES	3	6
Types – solid, liquid and gaseous. Petroleum refining by fractional distillation. Requirements of an ideal gasolene. Octane number. Qualities and ratings of C.I. Engine fuels. Additives in gasolene anti knock agents.		
5. FUEL SYSTEM IN SI ENGINES	8	18
Types of systems. A.C. Mechanical and S.U. Electrical pumps. Fuel filters and air cleaners. Carburetor and carburetion: Chemically correct A/F ratio; Mixture requirement for maximum power, minimum s.f.c, steady state operation and transient state operation; Simple/ Elementary carburetor; Circuits of complete carburetor. Petrol fuel Injection system: Principles and working; Timed and continuous; Advantages of Port F.I.		

6. FUEL INJECTION SYSTEM IN CI ENGINES Introduction and function; Requirements; Air and airless (mechanical, injection); Jerk Pump system; Unit injector system; Common Ract system; Distribution system; BOSH Fuel Injection Pump- working principles; Fuel Injector; Type of nozzles	6	12
7. COOLING SYSTEM IN I.C. ENGINES Necessity of cooling; Air and water cooling. Components of water cooling and their functions: - Radiator, water pump, thermostat, and fan.	4	10
8. LUBRICATION SYSTEM Objects of lubrication; Requirements of good lubricant; Types of lubricants; Lubrication systems:- a) Mist b) Wet sump c) Dry sump	4	10
9. COMBUSTION AND COMBUSTION CHAMBER S.I. Engines: Ignition lag, Pre-ignition; Detonation or knock; Different combustion chambers C.I. Engines: Ignition delay; Diesel knock; Combustion chambers	6	10
Total	48	100

PRACTICALS: List of Experiments:

1. Dismantling & assembling of Petrol Engine.
2. Dismantling & assembling of a Diesel Engine.
3. Determination of Flash point, Pour point & fire point of a fuel.
4. Determination of viscosity of an oil
5. Study of Petrol fuel pump, Carburetor, AC fuel pump and SU fuel pump,
6. Study of fuel injection system, fuel injection pump & fuel nozzle.
7. Study of air cooling system and water cooling system – Radiator, Water pump & thermostat.
8. Performance test on Petrol Engine
9. Performance test on Diesel Engine.
10. Speed, load and fuel consumption testing
11. Morse test
12. Heat balance sheet

REFERENCE BOOKS:

1. Automotive Mechanics by Crouse & Anglin
2. Automotive Mechanics by Joseph Heitner
3. Auto Engineering by B. S. Narang
4. Motor Vehicle by Newton, Steeds & Carrett
5. Automobile Engineering by Dr. Kirpal Singh
6. Auto Mechanics by Dr. Giri