

Subject Code: 1ET4020602	Subject Title: Automobile Engineering
Pre-Requisite	Thermal Engineering - I , II

RATIONALE:

All automotive vehicles are powered by automobile engines. Hence the fundamental knowledge of automobile engine is most essential for an auto technician. This course will help the students in manufacturing, inspection, operation, servicing and maintenance of various types of engines, and their different associative systems like lubricating systems, cooling systems, fuel systems, etc. Any automobile apart from engine is made of transmission system and other systems like brakes, steering, suspension systems, wheel and tyres. This course provides knowledge about these systems. This course is therefore a core course for Mechanical/automobile engineers and they should develop mastery over it. Modern automobiles have many instruments for indicating different quantities such as speed, level of fuel, temperature and automatic control systems for doors/windows etc. Ignition system and lighting system also require power. It is therefore essential for automobile engineers to have the fundamental knowledge of automobile electrical systems. This course tries to develop this knowledge and skills in the students, which would help them in installation of various electrical components, operation and maintenance of automobile electrical system. Understanding of this course will also be helpful for diagnosis and testing of electrical system.

COMPETENCY:

The course content should be taught and with the aim to develop different types of skills so that students are able to acquire following competency:

- Knowledge of maintain petrol and diesel automotive engines, install, inspect and maintain auto electrical systems.
- Install and test automobile power transmission, brakes, steering and suspension system during manufacturing
- Knowledge for maintain automobile power transmission, brakes, steering and suspension system during service

COURSE OBJECTIVE:

The theory should be taught and practical should be carried out in such a manner that students are able to understand basics of Automobile Engineering, conversant with drive train and transmission, types of steering system, brakes systems, basics of suspension, Vehicle Performance & Safety, basics of Vehicle maintenance, basics of servicing of various automotive components / system, safety norm of vehicle, various electrical systems

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous assessment
3	-	2	4	60	40	20	30

DETAILS OF COURSE CONTENTS:

SR. NO.	TOPIC	Total Hrs.	Weightage %
1	1.0 INTRODUCTION. 1.1 Know the objectives of learning this subject. 1.2 Need, Scope & importance of Automobile Engineering (AE) in industries. 1.3 Need of attitude, knowledge & skill required for application of AE. 1.4 Automobile-definition, classification, parts, description /specification, performance parameters, Indian and international manufacturers. 1.5 Vehicle –types of bodies, important dimensions and specification parameters.(including earth moving machineries.) 1.6 Chassis- components and their function, classification.	03	05
2	2.0 ENGINE SYSTEMS. 2.1 Internal combustion engines-types and classification used in automobile, thermodynamic cycles used, main parts /elements , fuel used and general arrangement sketch for each, performance parameters , applications and selection criteria. 2.2 Fuels-types, properties and applications. 2.3 Need and working of various types of LPG/CNG kits. 2.4 Air, fuel and exhaust gases circuits and working for petrol and diesel engines. 2.5 Carburetor-functions, types, sketch, elements, working, essential features, specifications, limitations and applications. 2.6 Petrol injection -functions, types, sketch, elements, working, comparison with carbureted fuel supply, merits, limitations and applications. 2.7 Fuel injection system for CI engines-functions, types, sketch, elements, working and applications. 2.8 Fuel injection systems for LPG and CNG-functions, types, sketch and working. 2.9 Fuel injection pump and fuel injector-functions, types ,specifications and applications. 2.10 Engine lubricants-types, standards/designations, properties and applications. 2.11 Lubrication-main parts of engine required lubrication, types,	12	30

	sketch, working and applications. 2.12 Engine cooling system-need, types, sketch, elements, working and performance parameters. 2.13 Supercharging and turbo charging- concept , need and applications.		
3	3.0 TRANSMISSION AND SUSPENSION SYSTEMS. 3.1 Introduction and requirement of transmission system. 3.2 Transmission system-types (electrical & electromagnetic, hydraulic and mechanical) and sub types, general arrangement, elements and working. 3.3 Main units (clutch, transmission, drive line and driving axle), their sub units, functions and essential features. 3.412 Clutch- principle of operation, types, sketch/arrangement, working and applications. 3.5 Gear box- important terminology in context of automobile engineering (including first/second/third/reverse/neutral gear), types and sub types, Sketch/arrangement, working and applications. 3.6 Drive line – types (including propeller shaft, universal joint, sprockets, chains), sketch /arrangement, elements, working and applications. 3.7 Driving axle- types (including final, differential, half shaft, etc), sub types, constructional sketch/arrangement, elements, working and applications. 3.8 Rear axle-functions, types and working. 3.9 Suspension –introduction, functions and requirements, elements - their types and working. 3.10 Suspension system- types, components, sketch / arrangement, working and applications. 3.11 Wheels- essential requirements, types and applications. 3.12 Need and methods of wheel balancing. 3.13 Tyres- essential requirements, types and applications.	10	25
4	4.0 CONTROL SYSTEMS. 4.1 Steering system- purpose, functions, general arrangement, basic parts and working. 4.2 Steering gears- types, sketch/arrangement, working and applications. 4.3 Power steering- types, sketch/arrangement, elements, working and applications. 4.4 Front and rear axle- functions, types and working, stub axle functions their shapes and working. 4.5 Braking system- functions, requirements, classification and types-sketch/ arrangement, elements, working and applications.	06	15
5	5.0 ELECTRICAL SYSTEMS. 5.1 Major systems (starting, charging, ignition and lighting), their Sub components and functions. 5.2 Common troubles and their remedies for electrical systems. 5.3 Sensors-classification and applications.	02	05

6	6.0 REPAIRS AND MAINTENANCE. 6.1 Preventive maintenance steps for various automobiles. 6.2 Requirements for running automobiles (like changing lubricants, engine tuning, noise level, regular checking of brake shoes and other parts, regular checking of various alignments, cleaning and adjustment, etc.) 6.3 Fault tracing methods and tools / equipment / devices / instruments used for fault tracing. 6.4 Common troubles, their causes and remedies. 6.5 Tools/equipment/devices used for carrying out preventive / breakdown maintenance and their applications. 6.6 Standard operative conditions for test.	06	15
7	7.0 STANDARDS AND CERTIFICATIONS. 7.1 Various emission standards and parameters for Pollution Under Control (PUC) certification. 7.2 Various tests and certificates requirements for on-road condition 7.3 Insurance-need, types, various agencies and documents required. 7.16 Valuation-need and considerations.	03	05

COURSE OUTCOME:

The student will be able to

- Identify the different parts of the automobile
- Explain the working of various parts like engine, transmission, clutch, brakes
- Describe how the steering and the suspension systems operate.
- Understand the environmental implications of automobile emissions
- Develop a strong base for understanding future developments in the automobile industry

LIST OF PRACTICAL:

Sr. No.	Description of Practical	Required Hours
01	Study and demonstration of Various automotive systems.	04
02	Performance tests (including SFC and BHP) for petrol and diesel engines.	04
03	Performance tests (including SFC and BHP) for gas based engine.	02
04	Dismantling, assembly and alignment of engine, transmission, control and steering systems of any one vehicle.	06
05	Preventive maintenance of two wheeler.	02
06	Wheel balancing.	02
07	Prepare and present seminar individually in your batch. (Seminar topic has to be given by teacher)	06
08	1. Visit at least one automotive manufacturer. 2. Visit at least one service center.	-

LIST OF REFERENCES:

1. Automobile Engineering R.K.Rajput (Laxmi Publications)
2. Automobile Engineering KIRPAL SINGH