

Branch Name:	Mechanical Engineering
Program Code:	ET402
Course Title:	Automobile Engineering
Course Code:	2ET4020602
Pre-requisite Course:	Thermal Engineering - I, II

Course Objectives:

1. The aim is to introduce students to the vehicle structure and associated systems. Fundamentals related to vehicle and its systems' layouts, basic design of vehicle body structure and selection of systems components are introduced.
2. To study function of various components in automotive vehicles clutches, power suspension, brakes, drive lines, universal joints, steering system.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	0	2	4	60	40	20	30	150

Course Contents:

Unit No	Topic	Total Hours	Weightage (%)
1	INTRODUCTION. • Know the objectives of learning this subject. • Need, Scope & importance of Automobile Engineering (AE) in industries. • Need of attitude, knowledge & skill required for application of AE. • Automobile-definition, classification, parts, description /specification, performance parameters, Indian and international manufacturers. • Vehicle types of bodies, important dimensions and specification parameters. (Including earth moving machineries.) • Chassis- components and their function, classification. • Introduction to electric vehicles & hybrid vehicles	3	05
2	ENGINE SYSTEMS • Classification of IC Engine and components, Engine terminology: bore, stroke, clearance volume, swept volume, TDC, BDC, compression ratio, mean effective pressure, Volumetric efficiency, indicated power, break power, friction loss, mechanical efficiency, thermal efficiency, power and torque. • BS-6 Fuel Properties • Need and working of various types of LPG/CNG kits. • Carburetor-functions, types, sketch, elements, working, essential features, specifications, limitations and applications. 2.6 Petrol injection	12	30

	-functions, types, sketch, elements, working, comparison with carbureted fuel supply, merits, limitations and applications. • Fuel injection system for CI engines-functions, types, sketch, elements, working and applications. • Fuel injection systems for LPG and CNG-functions, types, sketch and working. • Fuel injection pump and fuel injector-functions, types, specifications and applications. • Engine lubricants-types, standards/designations, properties and applications. • Lubrication-main parts of engine required lubrication, types, sketch, working and applications. • Engine cooling system-need, types, sketch, elements, working and performance parameters. • Supercharging and turbo charging- concept, need and applications. • Disposable techniques used for engine coolant. • Disposable techniques used for engine oil.		
3	TRANSMISSION AND SUSPENSION SYSTEMS • Introduction and requirement of transmission system. • Describe requirement of clutch and gearbox, explain construction and functional details of various types of clutches and gear boxes, explain various clutch actuating mechanisms, describe various gear shifting mechanisms, explain construction and working of torque converter. • Drive line – types (including propeller shaft, universal joint, sprockets, chains), sketch /arrangement, elements, working and applications. • Driving axle- types (including final, differential, half shaft, etc), sub types, constructional sketch/arrangement, elements, working and applications. • Rear axle-functions, types and working. • Suspension –introduction, functions and requirements, elements - their types and working. • Various types of wheel rims and its features. • Suspension system- types, components, sketch / arrangement, working and applications. • Tyre rating and specification, Types of tyre tread pattern, Tyre rotation procedure, Tyre recycling, benefits and ways to dispose	10	25
4	CONTROL SYSTEMS • Steering system- purpose, functions, general arrangement, basic parts and working • Steering gears- types, sketch/arrangement, working and applications. • Power steering- types, sketch/arrangement, elements, working and applications. • Front and rear axle- functions, types and working, stub axle functions their shapes and working. • Braking system- functions, requirements, classification and types-sketch/ arrangement, elements, working and applications.	6	15

5	ELECTRICAL SYSTEMS - Major systems (starting, charging, ignition and lighting), their Sub components and functions. - Common troubles and their remedies for electrical systems. - Sensors-classification and applications.	2	05
6	REPAIRS AND MAINTENANCE - Preventive maintenance steps for various automobiles. - 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.) - Fault tracing methods and tools / equipment / devices / instruments used for fault tracing. - Common troubles, their causes and remedies. - Tools/equipment/devices used for carrying out preventive / breakdown maintenance and their applications. - Standard operative conditions for test.	6	15
7	STANDARDS AND CERTIFICATIONS - Various emission standards and parameters for Pollution Under Control (PUC) certification. - Various tests and certificates requirements for on-road condition - Insurance-need, types, various agencies and documents required. - Valuation-need and considerations	3	05

List of Practical:

1. Study and demonstration of Various automotive systems.
2. Dismantling, assembly and alignment of engine, transmission, control and steering systems of any one vehicle.
3. Study of Preventive maintenance of two-wheeler.
4. Study of Wheel balancing.
5. Study of Hybrid vehicles.
6. Study of safety features of the automobile system.
7. Study of Electronic system of Automobiles.
8. Visit at least one automotive manufacturer, Visit at least one service center.

Reference Books:

Sr. No.	Title of Book	Author	Publication
1.	Automobile Engineering Vol- I & II	Dr. Kirpal Singh,	Standard Pub.& Dist.
2.	Automobile Engineering	R.B.Gupta	Satya Prakashan
3.	Automobile Engineering Vol- I & II	Dr. K.M.Gupta	Umesh Pub.
4.	Automobile Technology	Dr. N.K.Giri	Khanna Pub.
5.	Automotive Mechanics	W.Crouse	Tata Mc Graw Hill
6.	Automobile Engineering	G.B.S.Narang	Khanna Pub.

List of Open-Source Software/learning website:

1. https://www.youtube.com/watch?v=k_TkVZz9Vhs&pp=ygURZnJhbWUgYW5kIGNoYXNzaXM%3D.
2. <https://www.youtube.com/watch?v=16gLPNIstQ&pp=ygURZnJhbWUgYW5kIGNoYXNzaXM%3D>
3. <https://www.youtube.com/watch?v=ErWV4g1RDL4&pp=ygUcYnJha2luZyBzeXN0ZW0gaW4gYXV0b21vYmlsZQ%3D%3D>
4. <https://www.youtube.com/watch?v=drvSY-enrBE&pp=ygUdc3RlZXJpbmcgc3lzdGVtIGluIGF1dG9tb2JpbGU%3D>
5. <https://www.youtube.com/watch?v=dAuKg-6dd-0&pp=ygUdc3RlZXJpbmcgc3lzdGVtIGluIGF1dG9tb2JpbGU%3D>
6. <https://www.youtube.com/watch?v=JVPP0jhA2u0&pp=ygUjcG9sbHV0aW9uIHVuZGVyIGNvbnRyb2wgY2VydGlmaWNhdGU%3D>
7. <https://www.youtube.com/watch?v=bw8HreOKFmk&pp=ygUhcHJldmVudGl2ZSBtYWludGVuYW5jZSBvZiB2ZWhpY2xl>
8. <https://www.youtube.com/watch?v=Y3jcQCdeJAs&pp=ygUhcHJldmVudGl2ZSBtYWludGVuYW5jZSBvZiB2ZWhpY2xl>

Course Learning Outcomes (CLO) on completion of this course, the students will able to

CLO	Description	Bloom's Taxonomy Level
CLO1	Compare and select type of vehicle as per safety, features and applications.	3 Applying
CLO2	Demonstrate working of various Automobile Systems.	2 Understanding 4 Analyzing
CLO3	Study of wheel and tyre, identify faults and diagnosis of automobile systems.	3 Applying 5 Evaluating
CLO4	Study of modern hybrid Automobiles.	2 Understanding 5 Evaluating
CLO5	Develop a strong base for understanding future developments in the automobile industry.	3 Applying
CLO6	Understand the environmental implications of automobile emissions.	2 Understanding 6 Creating

Mapping of CLO with PO and PSO

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	L		L										L			
CLO2	H												M	M		
CLO3	L		M		M								M			
CLO4	L	M											L	M		
CLO5	M	L		M												
CLO6	L												L	L		

H: High, M: Medium, L: Low