INTRODUCTION TO AUTOMOBILE ENGINEERING

VI Semester: AE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AME552	Open Elective	3	-	-	3	30	70	100
Contact Classes:45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

COURSE OBJECTIVES:

The course should enable the students to:

I. Understand the function of various parts of automobile, features of fuel supply systems for S.I and C.I engines.
II. Distinguish the features of various types of cooling, ignition and electrical systems.
III. Identify the merits and demerits of the various transmission and suspension systems.
IV. Recognize the working of various braking and steering systems.
V. Summarize the ways and means of reducing the emissions from automobiles.

COURSE OUTCOMES (COs):

CO 1: Understanding design and analysis of power transmitting elements, selection of suitable materials and manufacturing processes.
CO 2: Analyzing the forces acting on various joints and their design.
CO 3: To develop an ability to identify, formulate, and solve various machine members problems
CO 4: Ability to design and analyze shafts with different geometrical features under various loading conditions.
CO 5: Ability to analyze and design of different Springs for required application.

COURSE LEARNING OUTCOMES (CLOs):

1. Understand the basic working of Auto mobile and different automobile components
2. Understand the importance of lubrication system in automobile.
3. Compare different fuel injection system and advantages of each individual and concept electronic controlled fuel injection.
4. Compare the different cooling processes in I.C engines, working of radiator and cooling accessories.
5. Analyse the different spark ignition system advantages of each individual system.
6. Understand the working of different automobile components like lighting system, horn, wiper, fuel gauge, temperature indicator.
7. Understand the different working principles of clutches, and fly wheel.
8. Analyse the transmission systems like gear boxes, propeller shafts, universal joints, differential gear boxes.
9. Explain the shock absorbers, suspension system and mechanisms.
10. Compare the types of braking system, working principles.
11. Explain the steering system and components of steering system.
12. Explain the steering mechanisms, techniques to improve better steering.
13. Understand the importance of pollution controls, pollution control techniques.
14. Understand the importance of alternative fuels to reduce the environment emotions.
15. Analyse the different alternative energy sources to reduce the environment emotions.

UNIT-I	INTRODUCTION	Classes: 09
Introduction to automobile engineering, chassis and automobile components, automobile engines, otto cycle, diesel cycle, dual cycle, engine lubrication, lubricating oil, lubrication oil filter, engine servicing; Fuel supply system; Fuel tank, strainer, feed pump, fuel filter, injection pump, injector, filters, electronic controlled fuel injection, common rail direct injection systems.		
UNIT -II	**COOLING SYSTEM**	**Classes: 09**
Cooling requirements, air cooling, liquid cooling, water forced circulation system, radiators, cooling fan, water pump, thermostat, pressure sealed cooling, antifreeze solutions, intelligent cooling; Ignition system: Function of an ignition system, battery ignition system, storage battery, condenser and spark plug, magneto coil ignition system, electronic ignition system, electronic ignition, spark advance mechanisms; Electrical system: Charging circuit, generator, current-voltage regulator, starting system, bendix drive mechanism solenoid switch, lighting systems, automatic high beam control, horn, wiper, fuel gauge, oil pressure gauge, engine temperature indicator.		
UNIT -III	**TRANSMISSION AND SUSPENSIONS SYSTEMS**	**Classes: 09**
Transmission system: Clutches, principle, types, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel. Gear boxes, types, constant mesh, synchro mesh gear boxes, epicyclic gear box, auto transmission, continuous variable transmission, propeller shaft, Hotch-Kiss drive, Torque tube drive, universal joint, differential, rear axles types, wheels and tyres; Suspension system: Objects of suspension systems, rigid axle suspension system, torsion bar, shock absorber, independent suspension system		
UNIT -IV	**BRAKING AND STEERING SYSTEMS**	**Classes: 09**
Braking system: Mechanical brake system, Hydraulic brakes system, Master cylinder, wheel cylinder, Requirements of brake fluid, pneumatic and vacuum brake, ABS; Steering system: Steering geometry, camber, castor, king pin, rake, combined angle toe-in, toe-out, types of steering mechanism, Ackerman steering mechanism, Davis steering mechanism, steering gears types, steering linkages.		
UNIT -V	**EMISSIONS FROM AUTOMOBILES**	**Classes: 09**
Emissions from automobiles, pollution standards national and international, pollution control techniques, petrol injection, common rail diesel injection, variable valve timing; Energy alternatives, solar, photovoltaic, hydrogen, biomass, alcohols, LPG, CNG, liquid fuels and gaseous fuels, hydrogen as a fuel for internal combustion engines, their merits and demerits		

Text Books:

1. WillamH Crouse,DonaldL.Anglin,–AutomobileEngineering‖,McGraw-Hill,10th Edition,2006.
2. Manzoor, NawazishMehdi, YosufAli, –A Text Book Automobile Engineering‖, Frontline Publications, 1st Edition,2008.

Reference Books:

1. R. K. Rajput, ―A Text Book of Automobile Engineering, Laxmi Publications, 1st Edition, 2015.
2. Joseph Heinter, ―Automotive Mechanics, CBS, 2nd Edition, 2006.
3. K. Netwon, W. Steeds, T. K.Garrett, ―Automotive Engineering‖, Butterworth-Heinamann, 13th Edition, 2016.
4. S. Srinivasan, ―Automotive Engines, Tata McGraw-Hill, 2nd Edition, 2003.
5. Khalil. U. Siddiqui, ―A Text Book of Automobile Engineering, New Age International, 1st Edition, 2012.

Web References:
1. http://www.nptel.kmeacollege.ac.in/syllabus/125106002/ 2. http://www.nptel.ac.in/courses/125106002/
E-Text Books:
1. http:// www.engineeringstudymaterial.net/tag/automotive-engineering-books 2. https://www.studynama.com/.../299-Automobile-engineering-lecture-notes-ebook-pdf
Course Home Page: