

## AUTOMOBILE ENGINEERING

| VII Semester: ME   |                              |                               |   |   |                          |               |                    |       |
|--|------------------------------|-------------------------------|---|---|--------------------------|---------------|--------------------|-------|
| Course Code  | Category                     | Hours / Week                  |   |   | Credits                  | Maximum Marks |                    |       |
| AME020   | ELECTIVE                     | L                             | T | P | C                        | CIA           | SEE                | Total |
|  |                              | 3                             | - | - | 3                        | 30            | 70                 | 100   |
| <b>Contact Classes:45</b>  | <b>Tutorial Classes: Nil</b> | <b>Practical Classes: Nil</b> |   |   | <b>Total Classes: 45</b> |               |                    |       |
| <p><b>COURSE OBJECTIVES:</b><br/> <b>The course should enable the students to:</b></p> <ol style="list-style-type: none"> <li>I. The need and scope of automobile engineering in the field of automotive industry.</li> <li>II. The basic concepts and working principles of various automobile systems.</li> <li>III. The problems associated with the power transmission from engine to rear axles by using the concepts of kinematics of machines.</li> <li>IV. The causes of automobile emissions and preventive measures according to the national and international standards.</li> </ol> <p><b>COURSE OUTCOMES:</b></p> <p>CO 1: <b>Recognize</b> the basic components of automobile and fuel injection systems.</p> <p>CO 2: <b>Compare</b> the fuel supply system for petrol and diesel engines.</p> <p>CO 3: <b>Explain</b> the working and operation process of various types of cooling systems used in automobile</p> <p>CO 4: <b>Identify</b> the various ignition systems and electrical circuits related to lighting horn.</p> <p>CO 5: <b>Analyze</b> the power transmission through clutches, gears, propeller shafts, universal joints and differential gear boxes.</p> <p>CO 6: <b>Demonstrate</b> different suspension systems used in motor bikes, cars, trucks for effective travel under several Load conditions.</p> <p>CO 7: <b>Determine</b> the braking force in order to stop the vehicle safely and choose respective braking system.</p> <p>CO 8: <b>Select</b> the correct steering mechanism by comparing various steering mechanisms.</p> <p>CO 9: <b>Analyze</b> the alternative energy sources, alternative fuels in order to reduce the emissions coming from automobiles.</p> <p>CO10: <b>Select</b> the suitable system and its technological developments for environmental friendly automobiles in the real world applications.</p> |                              |                               |   |   |                          |               |                    |       |
| <b>UNIT-I</b>  | <b>INTRODUCTION</b>          |                               |   |   |                          |               | <b>Classes: 09</b> |       |
| <p>Introduction to automobile engineering, chassis and body components, types of automobile engines, engine lubrication, engine servicing; Fuel system; spark ignition engine fuel supply systems, mechanical and electrical fuel pump, filters, carburetor types, air filters, petrol injection, multipoint fuel injection(MPFI) and gasoline direct injection systems; Compression ignition engines fuel supply systems, requirement of diesel injection systems, types of injection systems, direct injection systems, indirect injection (IDI) systems, fuel pump, nozzle, spray formation, injection timing, testing of fuel pumps, CRDI and turbocharged direct injection (TDI) systems.</p>   |                              |                               |   |   |                          |               |                    |       |
| <b>UNIT -II</b>  | <b>COOLING SYSTEM</b>        |                               |   |   |                          |               | <b>Classes: 09</b> |       |
| <p>cooling requirements, air cooling, water cooling, thermo, water and forced circulation system, radiators types cooling fan, water pump, thermostat, pressure sealed cooling, antifreeze solutions, intelligent cooling; Ignition system: Function of an ignition system, battery ignition system constructional features of storage, battery, contact breaker points, condenser and spark plug, magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers, spark advance and retard mechanism; Electrical system: Charging circuit,</p>  |                              |                               |   |   |                          |               |                    |       |

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| 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.  |   |                    |
| <b>UNIT -III</b>  | <b>TRANSMISSION AND SUSPENSIONS SYSTEMS</b> | <b>Classes: 09</b> |
| Transmission system: Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid flywheel, gear box, types, sliding mesh, constant mesh, synchro mesh gear boxes, epicyclic gear box, auto transmission, continuous variable transmission over drive, torque converter, propeller shaft, Hotch-Kiss drive, torque tube drive, universal joint, differential, rear axles, types, wheels and tyres.<br>Suspension system: Objects of suspension systems, rigid axle suspension system, torsion bar, shock absorber, independent suspension system, air suspension system, Daimler-benz vehicle suspension. |   |                    |
| <b>UNIT -IV</b>   | <b>BRAKING AND STEERING SYSTEMS</b>         | <b>Classes: 09</b> |
| Braking system: Mechanical brake system, Hydraulic brakes system, Master cylinder, wheel cylinder tandem master cylinder; Requirement of brake fluid, Pneumatic and vacuum brake, anti-skidbraking (ABS), regenerative braking; Steering system: Steering geometry, camber, castor, king pin, rake, combined angle, toe-in, toe-out, center point steering, types of steering mechanism, power steering, Hydraulic, electronics, Ackerman steering mechanism, Davis steering mechanism, steering gears types, steering linkages, special steering colomuns.   |   |                    |
| <b>UNIT -V</b>  | <b>EMISSIONS FROM AUTOMOBILES</b>           | <b>Classes: 09</b> |
| Emissions from Automobiles, Pollution standards national and international, various pollution control techniques: Multipoint fuel injection for spark ignition engines, common rail diesel injection, variable valve timing, closed crank case ventilation, pc valves, EGR valve, catalytic converters, catalyst window, lambda probe, energy alternatives, solar, photo-voltaic, hydrogen, biomass, alcohols, LPG, CNG, liquid Fuels and gaseous fuels, hydrogen as a fuel for internal combustion engines, their merits and demerits, standard vehicle maintenance practice.  |   |                    |
| <b>Text Books:</b>  |   |                    |
| 1. WillamH Crouse,DonaldL. Anglin, -AutomobileEngineering,,McGraw-Hill,10 <sup>th</sup> Edition,2006.<br>2. Manzoor, NawazishMehdi, YosufAli, -A Text Book Automobile Engineering,, Frontline Publications, 1 <sup>st</sup> Edition,2008.<br>3. Dr.KirpalSingh,-AutomobileEngineering,,StandardPublishers,,2 <sup>nd</sup> Edition,2013.  |   |                    |
| <b>Reference Books:</b>   |   |                    |
| 1.R.K. Rajput,-ATextBookofAutomobileEngineering,,LaxmiPublications,1 <sup>st</sup> Edition,2010.<br>2.S. Srinivasan,-AutomotiveEngines,,McGraw-Hill,2 <sup>nd</sup> Edition,2003.<br>3. Khalil U Siddiqui, -A Text Book of Automobile Engineering,, New Age International, 1 <sup>st</sup> Edition, 2009.   |   |                    |
| <b>Web References:</b>  |   |                    |
| 1. <a href="http://nptel.kmeacollege.ac.in/syllabus/125106002/">http://nptel.kmeacollege.ac.in/syllabus/125106002/</a>  |   |                    |
| <b>E-Text Books:</b>  |   |                    |
| 1. <a href="http://www.engineeringstudymaterial.net/tag/automotive-engineering-books/">http://www.engineeringstudymaterial.net/tag/automotive-engineering-books/</a><br>2. <a href="http://www.engineering108.com/.../Automobile_Engineering/Automobile-engineering-ebook">www.engineering108.com/.../Automobile_Engineering/Automobile-engineering-ebook</a>   |   |                    |
| <b>Course Home Page:</b>  |   |                    |