

**AUTOMOBILE ENGINEERING**

|                               |                  |                                 |           |                       |        |
|-------------------------------|------------------|---------------------------------|-----------|-----------------------|--------|
| <b>Course Code</b>            | 19ME4801A        | <b>Year</b>                     | IV        | <b>Semester</b>       | II     |
| <b>Course Category:</b>       | Program Elective | <b>Branch</b>                   | ME        | <b>Course Type</b>    | Theory |
| <b>Credits:</b>               | 3                | <b>L – T – P</b>                | 3 – 0 – 0 | <b>Prerequisites:</b> | Nil    |
| <b>Continuous Evaluation:</b> | 30               | <b>Semester End Evaluation:</b> | 70        | <b>Total Marks:</b>   | 100    |

| <b>Course Outcomes</b>  |  |    |
|---|--|----|
| Upon successful completion of the course, the student will be able to |  |    |
| <b>CO1</b>  | Explain basic components of an Automobile.   | L2 |
| <b>CO2</b>  | Illustrates the working of various systems of engines.   | L2 |
| <b>CO3</b>  | Describe the working of various automobile systems.  | L2 |
| <b>CO4</b>  | Discuss various alternative energy resources, emissions standards and application of plastic in automobiles. | L2 |

| <b>Contribution of Course Outcomes towards achievement of Program Outcomes &amp; Strength of correlations (3:High, 2: Medium, 1:Low)</b> |     |     |     |     |     |     |     |     |     |      |      |      |      |      |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1  | 1   | 1   | 1   |     |     |     |     |     |     |      |      | 1    | 3    | 1    |
| CO2  | 3   | 1   | 1   |     |     |     |     |     |     |      |      | 1    | 3    | 1    |
| CO3  | 3   | 1   | 1   |     |     |     |     |     |     |      |      | 1    | 3    | 1    |
| CO4  | 3   | 1   | 1   |     |     |     | 2   |     |     |      |      | 1    | 3    | 1    |

| <b>Syllabus</b> |   |                  |
|-----------------|---|------------------|
| <b>Unit No</b>  | <b>Contents</b>   | <b>Mapped CO</b> |
| <b>I</b>        | <b>INTRODUCTION</b> Components of four-wheeler automobile – chassis and body – power unit –power transmission – rear wheel drive, front wheel drive, 4-wheel drive.   | <b>CO1</b>       |
|                 | Types of automobile engines, engine construction, turbo charging and super charging – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation –engine service, reborning, decarburization, Nitriding of crank shaft.   | <b>CO2</b>       |
| <b>II</b>       | <b>FUEL SYSTEM</b><br>S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pump – filters–carburetor – types – air filters – petrol injection.<br>C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle, spray formation, injection timing, testing of fuel pumps.<br><b>COOLING SYSTEM:</b> Cooling Requirements, Air Cooling, Liquid Cooling, Thermosyphon, Forced Circulation System, evaporating cooling and pressure sealed cooling – antifreeze solutions.<br><b>IGNITION SYSTEM:</b> Ignition System-, battery, magneto, Electronic ignition | <b>CO2</b>       |
| <b>III</b>      | <b>TRANSMISSION SYSTEM:</b> Clutches: Principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly  | <b>CO3</b>       |

|    |  |     |
|----|--|-----|
|    | <p>wheel.</p> <p>Gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box, over drive torque converter.</p> <p>Propeller shaft – Hotch – Kiss drive, Torque tube drive, universal joint, differential rear axles – types – wheels and tyres.</p> <p><b>SUSPENSION SYSTEM:</b> Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.</p>  |     |
| IV | <p><b>STEERING SYSTEM:</b> Steering geometry – camber, castor, king pin rake, combined angle toe-in, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.</p> <p><b>BRAKING SYSTEM:</b> Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder, tandem master cylinder, Requirement of brake fluid, Pneumatic and vacuum brakes.</p>   | CO3 |
| V  | <p><b>ELECTRICAL SYSTEM:</b> Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.</p>   | CO3 |
|    | <p><b>EMISSION FROM AUTOMOBILES:</b> Pollution standards National and international – Pollution Control– Techniques – Multipoint fuel injection for SI Engines. Common rail diesel injection. Energy alternatives – Solar, Photo-voltaic, hydrogen, Biomass, alcohols, LPG, CNG, liquid Fuels and gaseous fuels, electrical-their merits and demerits.</p> <p><b>KEY AUTOMOTIVE PLASTICS APPLICATIONS:</b> Safety and Energy Management, Interiors and Occupant Safety. Glazing, Plastic-Metal Hybrid Structures, Headlamps, Body Panels, Under-the-Hood Components.</p> | CO4 |

| <b>Learning Resources</b>                        |   |
|--|---|
| <b>Text Books:</b>                               | <ol style="list-style-type: none"> <li>1. Automotive Mechanics-Vol.1 &amp; Vol.2, by Kirpal sing, Standard Publishers, New Delhi 2008.</li> <li>2. Automobile Engineering, (3rd edition), by William crouse, TMH Distributors, New Delhi.</li> <li>3. Plastics Application Technology for Safe and Lightweight Automobiles, Sudhakar R Marur, SAE International (30 October 2013), USA</li> </ol> |
| <b>Reference Books:</b>                          | <ol style="list-style-type: none"> <li>1. Automobile Engineering Theory and Servicing, by James D. Halderman and Chase D. Mitchell, Pearson education inc, 2001.</li> <li>2. Automobile Engineering, by Newton's steeds &amp; Garrett Automotive Mechanics Heitner, Butterworth International, London.</li> </ol>   |
| <b>E-Resources &amp; other digital Material:</b> | <ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in/courses/107/106/107106088/">https://nptel.ac.in/courses/107/106/107106088/</a></li> </ol>  |