

**B.E Semester: V**  
**Automobile Engineering**  
**Subject Name: Automobile fuels and lubricants (AE503)**

**Course Objective:**

- To present a problem oriented in depth knowledge of automobile fuels and lubricants.
- To address the underlying concepts and methods behind automobile fuels and lubricants.

**Teaching / Examination Scheme:**

| SUBJECT |                                 | Teaching Scheme |     |     |       | Total Credit | Evaluation Scheme |       |       |       |            | Total Marks |
|---------|---------------------------------|-----------------|-----|-----|-------|--------------|-------------------|-------|-------|-------|------------|-------------|
|         |                                 | L               | T   | P   | Total |              | THEORY            |       | IE    | CIA   | PR. / VIVO |             |
| CODE    | NAME                            | Hrs             | Hrs | Hrs | Hrs   | Hrs          | Marks             | Marks | Marks | Marks | Marks      |             |
| AE503   | Automobile fuels and lubricants | 3               | 0   | 2   | 5     | 4            | 3                 | 70    | 30    | 20    | 30         | 150         |

**Detailed Syllabus:**

| Topic no | Details   |
|----------|---|
| 1.       | <b>MANUFACTURE OF FUELS AND LUBRICANTS</b><br>Fuels, Structure of petroleum, refining process, thermal and catalytic cracking, products of refining process, manufacture of lubricating oil base stocks and finished automotive lubricants.   |
| 2.       | <b>FUELS FOR I.C. ENGINES</b><br>Types of Fuels, Liquid and gaseous fuels, heating value of fuels, higher and lower heating values, chemical structure of hydro-carbons SI Engine fuels, Volatility characteristics, desirable characteristics of SI Engine fuels, knock rating and additives, alternate fuels for SI engines. CI engine fuels, desirable characteristics, cetane rating, alternate fuels for CI engines, biodiesels. |
| 3.       | <b>COMBUSTION OF FUELS</b><br>Stoichiometry - calculation of theoretically correct air required for combustion of liquid and gaseous fuels, volumetric and gravimetric analysis of the dry products of  |

|    |  |
|----|--|
|    | combustion, mass of dry gas per kg of fuel burnt, mass of carbon in the exhaust gas, mass of carbon burnt to carbon-monoxide per kg of fuel, heat loss due to incomplete combustion, exhaust gas analysis by Orsat apparatus.  |
| 4. | <b>THEORY OF LUBRICATION</b><br><br>Engine friction: introduction, total engine friction, effect of engine variables on friction, hydrodynamic lubrication, elasto hydrodynamic lubrication, boundary lubrication, Hydrostatic lubrication bearing lubrication, functions of the lubrication system.                           |
| 5. | <b>LUBRICANTS</b><br><br>Specific requirements for automotive lubricants, types of lubricants, types of greases, characteristics of lubricating oils, viscosity, factors affecting viscosity and viscosity index, additives in lubricant, grades of lubricating oils and their designation, deterioration in lubricating oils. |
| 6. | <b>LUBRICATING SYSTEM</b><br><br>Types of lubricating system, splash lubrication, pressure feed lubrication, oil strainer, oil pump, oil filters, cooling of lubricating oils, semi pressurized lubrication system, dry sump lubrication, crankcase ventilation, chassis lubrication.  |

#### **Lesson Planning:**

| Sr.No. | Date/Week  | Unit No. | % Weightage | Topic No: |
|--------|--|----------|-------------|-----------|
| 1      | 1 <sup>st</sup> , 2 <sup>ed</sup> , 3 <sup>ed</sup>    | Unit 1   | 20 % .      | 1,4       |
| 2      | 4 <sup>th</sup> , 5 <sup>th</sup> , 6 <sup>th</sup>    | Unit 2   | 20 %        | 2         |
| 3      | 7 <sup>th</sup> , 8 <sup>th</sup> , 9 <sup>th</sup>    | Unit 3   | 20 %        | 3         |
| 4      | 10 <sup>th</sup> , 11 <sup>th</sup> , 12 <sup>th</sup> | Unit 4   | 20 %        | 5         |
| 5      | 13 <sup>th</sup> , 14 <sup>th</sup> , 15 <sup>th</sup> | Unit 5   | 20 %        | 6         |

#### **Instructional Method & Pedagogy**

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed

- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.
  - Study of International and National standards for fuels and lubricants.
  - Draw the chart & describe distillation process of crude.
  - Determination of viscosity of lubricating oil at different temperature.
  - Determination of flash and fire point of given sample fuel.
  - Determination of cloud and pour point of given sample of oil.
  - Testing of fuels - Ultimate analysis, proximate analysis.
  - ASTM distillation test of liquid fuels.
  - Calorific value of liquid fuel.
  - Calorific value of gaseous fuel.
  - Study of Octane and Cetane Number of fuels.

Practical / Oral: The candidate shall be examined on the basis of term-work.

#### **Students Learning Outcomes:**

- The student can identify different areas of automobile fuels and lubricants.
- Can find the applications of all the areas in day to day life.

#### **Recommended Study Materials:**

- **Text & Reference Books:**
  1. V.Ganesan, "Internal Combustion Engines" Tata McGraw-Hill Publishing Co. Newdelhi
  2. M.L.Mathur and P.Sharma "A course in internal combustion engines", Dhanpatrai Publications
  3. Brame, J.S.S. and King, J.G. – Fuels – Solids, Liquids, Gaseous.
  4. Francis, W – Fuels and Fuel Technology, Vol. I & II
  5. Hobson, G.D. & Pohl.W- Modern Petroleum Technology
  6. A.R.Lansdown – Lubrication – A practical guide to lubricant selection – Pergamon press – 1982.
  7. Raymond.C.Gunther – Lubrication – Chilton Book Co., - 1971.
  8. K.M.Gupta vol-1-Automobile Engineering-umesh publications.