| AE307: Combustion Generated Pollution | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **L** | **T** | **P** | Credit | Area | | **CWS** | **PRS** | **MTE** | **ETE** | **PRE** |
| 3 | 0/1 | 2/0 | 4 | DEC | | 15/25 | 25/- | 20/25 | 40/50 | - |

**Objectives:** To introduce the students with types fuels, emissions from various engines, exhaust treatment of various engines and instruments used for measuring emissions

| **AE307: Combustion Generated Pollution** | | **Contact Hours** |
|---|---|---|
| **Unit-1** | Combustion fundamentals: Fuels, alternative fuels for IC engines, Type of hydro carbons. Gasoline specifications. Effect of Engine parameters on performance, fuel injection for SI engines, Engine vehicle road performance, road performance and fuel economy. | **8** |
| **Unit-2** | Emissions and air pollution: Automotive Emissions and their role in air pollution. Photo chemical smog. Chemistry of smog formation. Combustion in Homogeneous mixtures, emission formation. Incomplete combustion, formation of hydro carbons, Carbon monoxide and oxides of nitrogen. Aldehyde emissions. | **6** |
| **Unit-3** | SI engine combustion Emissions: Influence of design and operating variables on gasoline engine exhaust emissions. Hydrocarbon Evaporative Emissions: Various sources and methods of their control. Canisters for controlling evaporative emissions. Emission control systems for gasoline engines: Blow by control closed PCV system design. | **6** |
| **Unit-4** | CI engine combustion Emissions: Sources of emissions during combustion. Effect of air fuel ratio, speed, injection timing on performance and emission formation. D.I and I.D.I engine emissions, smoke emission from diesel engines | **8** |
| **Unit-5** | Exhaust treatment devices: Air injection into exhaust system, Thermal reactors, Catalytic convertor. Stratified charge engines. Honda CVCC engine. Methods of reducing emissions exhaust gas recirculation. | **8** |
| **Unit-6** | Emission Instruments: Non- dispersive Infrared analyzer, Gaschromotograph, flame ionization detector, Chemiluminescent analyzer | **6** |
| | **Total** | **42** |

| **Reference Books:** | |
|---|---|
| 1 | B.P. Pundir, Engine emission :, Narose Publication ISBN-13: 978-8184870879 |
| 2 | Paul Degoberd, SAE Automobile and air pollution, SAE Publication ISBN 978-. 07680-6437-7 |
| 3 | J.P. Heywood, Fundamentals of I.C. Engines,Tata McGraw Hill Publication. ISBN 13: 9780071004992 |

**Course Outcomes**

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|---|---|
| CO1 | Student will know about combustion fundamentals, engine performance with fuel economy. |
| CO2 | Student will know about emission formation and its effect on pollution formation. |
| CO3 | Student will know about SI engine combustion Emissions its sources and how to control it. |
| CO4 | Student will know about CI engine combustion Emissions its sources and how to control it. |
| CO5 | Student will know about Exhaust treatment devices (Thermal reactors, Catalytic convertor etc) and EGR |
| CO6 | Student will know about different Emission Instruments. |

**CO-PO/PSOMatrix**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 1 |
| CO2 | 3 | 3 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 |
| CO3 | 3 | 3 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 2 |
| CO5 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 |