

Department of Mechanical Engineering  
Indian Institute of Technology New Delhi  
II Semester -- 2017 – 2018

*MCL 321 AUTOMOTIVE SYSTEMS*

**PROBLEM SET – 1: Analysis of SIMPLE Cycles for I.C. Engines**

Problem Statement1: Ford EcoSport had won the most number of awards amongst launches in the calendar year 2013. The EcoSport comfortably seat 5 passengers, all while being fully adjustable to accommodate all your gear. So immerse yourself in the Endeavour’s luxurious dual-toned interior and let the EcoSport’s 20 specialized storage compartments keep your trips perfectly organized. There are many variants of Ecosport. Following table shows engine specifications of a selected model.

Details	1.5P Ambiente
Displacement (cc)	1499
Max Power output(kW)	82@6300RPM
Max. Torque (Nm)	140@4400RPM
Compression Ratio	11:1
Fuel calorific value (kJ/kg)	48,000

Carry out thermodynamic analysis to study the effect of compression ratio and Maximum temperature on engine performance and size using Air Standard and Variable Property Otto Cycles.

Problem Statement 2: The Diesel variant of Ecosport is having following engine specifications.

Details	1.5D Ambiente
Displacement (cc)	1498
Max Power output(kW)	67@3750RPM
Max. Torque (Nm)	204 @ 2750RPM
Compression Ratio	16:1
Fuel calorific value (kJ/kg)	44.800

Carry out thermodynamic analysis to study the effect of compression ratio, cut-off ratio and Maximum temperature on engine performance and size using Air Standard and Variable Property Diesel and Dual cycles.

Problem Statement 3: The YZF-R15 is a concept aimed at Humachine Technologies & Sensual Racing . This is equipped with under cowls that are based on the image of a diffuser, to give them the best form for aero-management. These cowls forms composed of blade surfaces that actively control airflow.

Following are specifications of the engine:

- Engine Type : Liquid cooled, 4stroke, SOHC
- Engine Displacement(cc) : 149.8 cc
- Compression Ratio :10.4:1
- Maximum Power : 17BHP@8500 RPM
- Maximum Torque :15Nm@7500 rpm
- Air fuel ratio = 1: 14.7
- Calorific value of gasoline = 45,200 kJ/kg

Develop various possible ideal cycles for power plant using above mentioned information. Also develop following characteristic curves.

- Fuel consumption Vs engine speed.
- FC Vs power output.

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