



Module 2: Assignment Vehicle Fundamentals

Problem Statement:

You are a mechanical engineer working for a leading automotive manufacturer specializing in hybrid vehicles. Your team is responsible for evaluating the performance and efficiency of various vehicle components to optimize fuel consumption and overall vehicle performance. You have been assigned a project to analyze and calculate several key parameters related to the powertrain and efficiency of a new hybrid vehicle model.

Tasks to be Performed:

1. Engine mechanical efficiency:

Given:

- Mechanical work output = 320 Nm
- Energy input from fuel = 100 MJ

2. Brake power of the engine:

Given:

- Engine speed (N) = 3000 RPM
- Torque (T) = 250 Nm

3. Torque transmitted from the clutch:

Given:

- Coefficient of friction (μ) = 0.3
- Normal force (W) = 500 N
- Radius of clutch (R) = 0.1 m

4. Transmission efficiency:

Given:

- Output power = 150 kW
- Input power = 180 kW

5. Propeller shaft turning speed:

Given:

- Engine RPM = 4000 RPM

- Gear ratio = 3.5

6. Differential gear ratio:

Given:

- Number of teeth on the ring gear = 45
- Number of teeth on pinion gear = 15

7. Degree of hybridization in hybrid vehicles:

Given:

- Motor power = 50 kW
- Engine power = 120 kW