

## **Internal Combustion Engines 1**

1. Calculation of engine parameters, absolute and specific values, power, torque, fuel consumption, piston velocity, engine maps, etc.
2. Intake airflow, volumetric efficiency, pressure waves, critical pressure ration, sonic speed, the dynamics of charge exchange process
3. Thermodynamic summary, theoretical and real thermal processes.
4. Processes of combustion, heat release and heat losses in SI and CI engines.
5. Formation of pollutants, comparison of SI and CI engines, internal reduction of pollutants, exhaust gas aftertreatment.
6. Forced induction, devices of forced induction, characteristics and maps, limitations, interaction of engine and turbocharger/supercharger.
7. Multi-stage turbocharging, charge air cooling, control of boost pressure, steady state and transient behaviour of turbocharging systems.
8. Analysis of losses, definition of different efficiencies.
9. Mixture formation of SI engines (carburettor, SPI, MPI, DI).
10. Mixture formation of CI engines (geometrically controlled, time-controlled systems).