Question list 1

Aerodynamics and Flight Mechanics; Code: MK3AEROJ06JL20-EN
ECTS Credit Points: 6

1. Explain the principle of lift generation on an airfoil and identify the factors that contribute to lift according to the Bernoulli's principle and Newton's Third Law of Motion.
2. Explain the concept of Mach number and its significance in aerodynamics. How does aircraft performance change at transonic and supersonic speeds?
3. Discuss the concept of boundary layer in aerodynamics. What are the differences between laminar and turbulent flow within the boundary layer?
4. Explain the concepts of lift coefficient (Cl) and drag coefficient (Cd) and their variation with angle of attack. What is the importance of the lift-to-drag (L/D) ratio in aircraft performance? How does this ratio change with varying angles of attack?
5. Explain the significance of the angle of attack (AOA) and angle of incidence (AOI) in aircraft performance. How do they affect lift and drag?

Aircraft Engines I; Code: MK3REH1J08JL20-EN
ECTS Credit Points: 8

1. Discuss the fundamental components and operation of a gas turbine jet engine and core of engine. [core units such as the inlet duct, compressor (both low-pressure and high-pressure stages), combustion chamber, turbine (including both high-pressure and low-pressure turbines), and exhaust duct]. Explain the role of each component in the propulsion process and how it contributes to engine performance.
2. Discuss the structure and operation of the low-pressure compressor in a gas turbine jet engine, highlighting its configuration, including axial and radial designs. Analyze the pressure conditions and temperature rise across the low-pressure compressor stages.
3. Discuss the role and operation of the combustion chamber in a gas turbine engine. Explain how it achieves high pressure by increasing temperature and characterize typical temperature and pressure conditions.
4. Evaluate the efficiency and performance of a simple gas turbine jet engine based on the operation of its main components, including the inlet duct, compressors, combustion chamber, and turbine.
5. Explain the concept of afterburners used in supersonic aircraft propulsion systems, highlighting their role in increasing thrust and achieving speeds above the speed of sound. Discuss the afterburner as a form of ramjet propulsion system and analyze steam temperatures and pressures within the afterburner.