Review questions on MSJ0001 Thermal engineering

- 1. Basic concepts of thermodynamics (thermodynamic system, properties of a system, state and equilibrium).
- 2. Ideal gas. The ideal gas equation of state.
- 3. Real gas.
- 4. Gas mixtures. Dalton's law. Mixture composition and component fractions.
- 5. Moving boundary work. Technical work. Graphical determination of a work on *pv*-diagram.
- 6. Internal energy.
- 7. Heat.
- 8. The first law of thermodynamics. Mathematical expression.
- 9. Enthalpy.
- 10. Entropy.
- 11. Specific heat capacity. Mayer's equation. True and average specific heat.
- 12. Thermodynamic iso-processes.
- 13. Reversible and irreversible processes.
- 14. Flow. Regimes of a flow. Continuity equation. Bernoulli equation.
- 15. Adiabatic expansion and compression processes. Multistage compression.
- 16. Throttling process.
- 17. Thermodynamic cycle. Efficiency of a cycle.
- 18. The Carnot cycle.
- 19. The Carnot reversed cycle.
- 20. The second law of thermodynamics.
- 21. Phase diagram. Critical point. Triple point. Saturation curves.
- 22. Processes with water and water vapor. Quality of a vapor.
- 23. Water and water vapor tables.
- 24. Principal scheme of steam power plant.
- 25. Reversible Rankine cycle.
- 26. Influence of steam properties on the efficiency of the Rankine cycle.
- 27. Actual Rankine cycle.
- 28. Cogeneration (CHP) plant.
- 29. Principal scheme of a gas-turbine engine. Brayton cycle.
- 30. Combined cycle.
- 31. Reciprocating internal combustion engines. Otto cycle. Diesel cycle. Comparison.
- 32. Working principal of refrigerator and heat pump. Principal scheme.
- 33. Thermodynamic cycles of refrigerator and heat pump. Efficiency.
- 34. Heat transfer. Basic concepts.
- 35. Heat conduction.
- 36. Heat convection.
- 37. Radiation heat transfer.
- 38. Heat exchangers.
- 39. Fuel. Classification. Composition. Heating value. Excess air.
- 40. Boiler losses and boiler efficiency.

Andrei Dedov, associate professor 12.11.2019,