

Mechatronics MSc
Devices of mechatronics
Final state exam, Question list 2017
Dr. Czifra, Árpád

1. a. Explain the permissible stress theory (limit stress, real stress)!
b. Characterize the sliding bearings and basic requirements against bearing materials!
2. a. Explain the theory of load carrying capacity (strain beyond the elastic limit)!
b. Present the planetary gear systems (types, properties, degree of freedom)!
3. a. Explain the high cyclic fatigue (Wöhler curve, Smith diagram, Haigh diagram, theory of cumulative damage)!
b. Describe the hydrodynamic and eddy current brakes!
4. a. Draw the conceptual scheme of harmonic drives and give information about their operation and application!
b. Describe the rolling guides! (ball and roller guides, methods to increase their lifetime)
5. a. What are the types of unbalancing? How can a mechanical system be balanced?
b. Describe the transmission ratio and design (construction) aspects of harmonic drives!
6. a. Vibration absorbers and vibration isolation!
b. Explain the calculation method and affecting factors of efficiency of planetary gear trains!
7. a. Explain the methods of design of machine foundation (tune below, and above resonance; operation in resonance)!
b. Shoe and disc brakes (types, construction, operation, application)!
8. a. Tribology (definitions, basics), tribological system (parts, function, principles) and test methods of tribology.
b. High-speed and high-precision rolling bearings (principles, applications)!
9. a. Surface unevenness, surface roughness measurement (techniques, principles of characterization).
b. Hydrostatic bearings: properties, basic principles, application, design!
10. a. Friction: sources of friction, manage friction.
b. Velocity diagram (Kutzbach) of planetary gear trains.
11. a. Wear mechanisms: basic principles, processes, influence of wear process!
b. Linear bearings: sliding guides (with and without lubrication, hydrostatic guides).
12. a. Self-acting clutches (types, basic concepts).
b. Explain the design aspects of planetary gear trains!
13. a. Compare the traditional and concurrent design! Present the philosophy of „Design for Manufacturing and Assembly”!
b. Shoe and disc brakes (types, construction, operation, application)!