

Final exam question list

MSc

I. Subject group

1. Engineering points of view of design. Describe the process and the method of design! What kind of models we use in mechanical design process?
2. What is factor of safety? Design for fatigue. Role of endurance limit reduction factors!
3. Description of adhesive joints! Design requirements, calculation procedure!
4. Description of riveted joints! Design requirements, calculation procedure!
5. Description of bolted joints! Design requirements, calculation procedure!
Joint diagram!
6. Design and selection of rolling bearing. Lifetime calculation.
7. Calculation of belt drives! Forces on belt, and belt drives, stress calculation.
Role of slip.
8. Lifetime calculation of belt drives! Factors influencing of belt lifetime.
9. Types of gears. Nomenclature, fundamentals of evolvent gear drives.

II. Subject group (Specialization)

1. Damped driven one degree of freedom oscillators. Resonance.
2. Reduction of vibrating systems, Lagrangian equations.
3. Statically and dynamically unbalanced rotation.
4. Eigenfrequencies of multiple degree of freedom vibrating systems.
5. Torsional and bending vibrations of shaft-gear systems.
6. How can we model a beam structure in FEM? What type of finite elements, parameters, boundary conditions can be used?
7. How can we model a plane stress problem in FEM? What type of finite elements, parameters, boundary conditions can be used?
8. How can we model an axisymmetric structure in FEM? What type of finite elements, parameters, boundary conditions can be used?
9. How can we model a thin walled body in FEM? What type of finite elements, parameters, boundary conditions can be used?
10. How can we model a solid body in FEM? What type of finite elements, parameters, boundary conditions can be used?
11. – 15. Create a 3D model according to the given drawing.