In effect from: 2018/19 I. semester	**Machine Tools and Manufacturing Systems BMEGEGTAG92**	

Questions (Theses) for Final Exam

1. What are the three main units of CNC machine tools? Describe shortly what belongs to each main unit. Describe the basic CNC integration. What is the main function of the NC program translator? What is the main function of the interpolator?

2. Structural materials of machine tools. Trends in structural materials / structural design of machine tools.

3. Main building units of linear motion systems. Advantages and disadvantages of sliding (friction) guideways. Typical constructions of linear sliding guideways.

4. Advantages and disadvantages of rolling guideways. Types of rolling guideways. Service life calculation and static load calculation of rolling guideways.

5. Principle and characteristics of hydrostatic guideways.

6. Main parts of a ball screw drive. Characteristics and types of ball screws. Preloading methods of ball screws. Mounting methods of ball screws.

7. Selection (calculations) of ball screws: (1) Service life (dynamic load); (2) Permissible rotational speed; (3) Permissible buckling load; (4) Permissible static load. Definition of DN number of ball screws. Problems / limitations of using ball screws.

8. Rack and pinion drive: advantages, disadvantages, preloading methods, application for machine tools.

9. Linear motors: types; advantages and disadvantages; their application for machine tools.

10. Describe the main characteristics of the following machine tools:
    a) Milling machines;
    b) Lathes;
    c) Machining centres;
    d) Turning centres.

    What is the main difference between a CNC milling machine and a machining centre? What is the main difference between a CNC lathe and a turning centre?

11. Machining centres I.
    a) Definition;
    b) Types of tool magazines;
    c) Types of tool changers.

12. Machining centres II.
    a) 5-axis machining centres: typical construction variants;
    b) Types of pallet changers;
    c) Types of pallet stores.

13. Parallel kinematics machine tools (PKMs).
    a) Principle of parallel kinematics machine tools.
    b) Draw simple sketches of the Hexapod and Hexaglide types of parallel kinematics machine tools and compare their main properties.
    c) What are the advantages and disadvantages of parallel kinematics machine tools compared to the serial machine tools?

14. Define the categories of manufacturing systems by placing them in the two dimensional x-y coordinate system of productivity (x) and flexibility (y). Define the category ‘flexible manufacturing systems’ in more detail (definition; typical equipment used). Compare the two categories of ‘transfer line’ and ‘flexible manufacturing system’.

15. Characterise the types ‘static layout’ and ‘product layout’ of manufacturing systems.

16. Characterise the types ‘process layout’ and ‘group technology’ of manufacturing systems.