**Valid from: 01/10/2023**

# ISSUES FOR THE DIPLOMA EXAMINATION –

# Mechatronics 1st degree

1. Hardware and software components of computer networks.

2. Routing in computer networks.

3. The seven-layer OSI / ISO model.

4. Structures of computer networks.

5. Communication interfaces used in mechatronic systems.

6. Asynchronous programming.

7. Inheritance in object-oriented programming.

8. The concept of an artificial neural network. Selected models of an artificial neuron.

9. Methods of training artificial neural networks.

10. Types of passive and active elements in electronics.

11. Features of an ideal operational amplifier. Examples and applications of an operational amplifier.

12. The concept of active power, reactive power and apparent power.

13. Role of feedback in cotnrol systems.

14. Describe the basic signal parameters (amplitude, average value, effective value, frequency, pulsation, power)

15. Functional diagram of a typical automatic control system with a feedback loop.

16. Operation principle of a programmable logic controller (PLC).

17. Manipulator workspace.

18. Sensory systems used in robotics.

19. Navigation systems of mobile robots (wheel drive, caterpillar drive).

20. Advantages and disadvantages of walking mechanisms.

21. Materials used in the construction of machines and devices.

22. Basic differences between steel and cast iron.

23. Types of carbon steel.

24. Basic machining processes in the production of machine parts.

25. Types of connections of parts in machine building.

26. Bearings - application, components.

27. Types of transmissions used in machine building

28. What is the Internet of Things. How does it work.

29. Types of lubricants.

30. Methods of manufacturing plastic parts.

31. Examples of mechanical drives.

32. Wear process of machine parts.

33. Reliability of machinery and technical devices.

34. Purpose and content of operation and maintenance documentation.

35. Aims of building a prototype of a machine or device.

36. Basic types of composite materials.

37. Heat treatment of metals.

38. Protective coatings for machine parts.

39. The role (importance) of engineering fits in machine elements.

40. Definition of friction. Parameters describing friction. The role of friction in various constructions of technical devices.

## Area issues - Computer Engineering and Mechatronics

1. Transmission media in LAN networks.

2. Properties of a real-time operating system.

3. Properties of a microcontroller.

4. Classic genetic algorithm.

5. Definition of RMS voltage.

6. Differences between welding, soldering and welding.

7. Gear transmissions.

8. Pneumatic and hydraulic drives.

9. Building a user interface for an Android mobile application - visual interface elements, views, etc.

10. Construction of a servomechanism. Application examples.

11. Application of artificial intelligence in robotics.

12. Application of renewable energy resources in robotics.

13. Definitions of terms: photovoltaic cell, photovoltaic module, matrix of photovoltaic modules.

14. Construction and operation of a photovoltaic module. Types and characteristics of basic electrical parameters of a photovoltaic module.

15. Energy harvesting.

16. Characteristics of HTTP protocol.

17. Relational database model.

18. The concept of Context, Activity, Intent and Service in Android.

19. The use of open hardware platforms such as Arduino or Raspberry Pi. Advantages and disadvantages of their use.

20. Differences between a class and an object.