TECHNICAL UNIVERSITY OF KOŠICE
Faculty of Mechanical Engineering

Institute of Automation, Mechatronics, Robotics and Production Systems
Department of Mechatronics
Letná 9/B | 042 00 Košice

Questions for state exams in the subject: Mechatronic systems
Study program: Mechanical Engineering (1.degree BC); Industrial mechatronics (1.degree BC)
Academic year: 2020/2021

1. Mechatronics. Reasons of mechatronics establishment.
   Redundancy principle in applications with microcontrollers.

2. Advantages of mechatronic products. Motivation for mechatronics.
   Sensors of non-electric quantities with continuous change of analog output.

3. Embedded systems. HIL simulations.
   Analog to digital converter. Principle of AD converter. Converter resolution. Quantization step. Converter range.

4. Information. Analogie signal. Digital signal.
   Realization of logic system using microcontrollers.

5. TTL logical levels. Binary coding.
   Pulse width modulation PWM - non-electric quantity sensors with pulse-width modulated output.

6. Flowcharts.
   PWM modulation. DC motor controlling. Sensors with PWM output.

7. Microcontrollers. Basic features and architecture.
   Sensors of non-electrical quantities with modulated output.

8. PC connection. Types of variables and their declaration. Program styling.
   High power control. Transistor effect. Switch with bipolar transistor.

9. Xbee, ZigBee wireless microcontroller connection. Applications.
   Position servomechanisms. Principle of working.

10. Generation of logic levels on input / output pins of microcontroller. Connection of LEDs. Program cycles and conditional statements.
    Method of controlling servomechanisms by microcontroller. Modification of position servomechanism for continuous rotation.

11. Connection of resistance sensors with continuous change of electrical resistance. Signal processing by voltage dividers.
    Network structure of microcontrollers. Modulation and demodulation of signals. Communication - data transmission.

12. Detection of binary signals by microcontroller. Connection of switches and resistance sensors with step change of electrical resistance.
    Methods of signal transmission.

13. Hermetic closed switch relay contact – Reed swirch. PIR sensors. Connection to microcontroller input.
    Photoresistor, thermistor, connection to TTL inputs of microcomputer. Methods of application in voltage divider.

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lecturer

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