Lista zagadnień na egzamin dyplomowy

Kierunek studiów:	**Automatic Control and Robotics**	Stopień studiów:	**pierwszy**
Specjalność:			

Nr	Zagadnienia
1	Ways to pass arguments to functions in C++. **[Information engineering]**
2	The role of the IP address in network communication. **[Information engineering]**
3	Representation of w floating point variables in memory. Storing in memory and referring to containers of STL library: vector, map, list. **[Information engineering]**
4	Basic laws of electrical engineering. **[Electrical engineering]**
5	Conservation laws in physics. **[Physics]**
6	Normal stress - strength criterion, allowable stress, and factor of safety. **[Theoretical mechanics and mechanics of materials]**
7	Quantities characterizing random signals. **[Signals and dynamic systems]**
8	Models of dynamic objects. **[Signals and dynamic systems]**
9	Tuning of linear controllers. **[Control basics]**
10	Interplay between frequency- and time-domain responses. **[Control basics]**
11	Control performance indices. **[Control basics]**
12	Programming model for real-time systems. **[Real-time systems]**
13	Process synchronization and communication mechanisms. Real-time algorithms for tasks scheduling. **[Real-time systems]**
14	Measurement uncertainty. **[Metrology]**
15	Sensors and transducers of non-electrical quantities. **[Metrology]**
16	Microcontroller peripherals (GPIO, TIM, PWM, ADC, DAC, UART, SPI, I2C, CRC, RTC, PWR, WDT), operation and parameters, typical hardware input and output interfaces. **[Microprocessor systems]**
17	Microprocessor system for network communication (Ethernet, IPv4, TCP, UDP, HTTP, SNTP). **[Microprocessor systems]**
18	Software and hardware implementation, incl. multiplexers, demultiplexers, flip-flops and memory. Software and hardware implementation of sequential and combinational circuits. **[Microprocessor systems]**
19	Direct and Inverse kinematics of robot manipulators. Classification of methods for solving inverse kinematic problem. **[Robotics]**
20	Robot manipulator dynamics model. **[Robotics]**
21	Robot control methods; hybrid force/position control of robots. **[Robotics]**
22	Basic system identification methods for ARX and OE structures (including model order estimation). **[System identification]**
23	Identifiability and parameter estimation in a closed-loop system. **[System identification]**
24	Motion commands of robot manipulators and their parameters. Kinematic singularities of robot manipulators. **[Robot programming and task planning]**
25	Offline robot programming. **[Robot programming and task planning]**
26	State observers. **[Control theory]**
27	Design and manufacturing process of the Printed Circuit Board - from concept to manufacturing, assembly and testing. **[Electronical and electrical circuits designing]**
28	Scalar and vector control of AC induction motors. **[Control of motion and electric vehicles]**
29	Cascade control of position, speed and current of the electric drive - influence of limitations on output signals. **[Control of motion and electric vehicles]**
30	Mechanical joints in machine design. Basic machine parts of the drive systems (axles and shafts, bearings, clutches, brakes and transmissions). **[Mechanical constructions]**
31	Peripherals handler in Linux (GPIO, SPI, I2C, UART). Data structures in JSON for sensors and actuators. **[Networks and distributed control systems]**
32	Client-server architecture in terms of the web interface. Implementation of the server application (python, PHP, C) and client application (HTML, CSS, JS). **[Networks and distributed control systems]**

33	Attitude sensors in aerial robots. Hardware components of multi-rotor flying platforms. Quadrotor flight dynamics and control. **[Flying robots]**
34	Principle of operation of basic functional blocks of programmable controllers, timers and counters. **[Digital controllers and PLC]**
35	Rules of creating programs in languages: LD, FBD and SFC. Cycle of operation of a programmable controller. **[Digital controllers and PLC]**
36	Types of production and concepts of their automatization. **[Flexible manufacturing systems]**
37	Petri nets. **[Flexible manufacturing systems]**
38	Numerical modelling of dynamic objects. Advanced control structures (2DOF, Smith predictor, internal model control, predictive model control, artificial neural networks). **[Analysis of control systems]**
39	Communication mechanisms between nodes in Robot Operating System. **[Tools and software for robotic systems]**
40	Scientific libraries available in Python. Describe at least two of them. **[Tools and software for robotic systems]**