

Problem topics for the **State Bachelor Exam**  
study field "*Information and Automation Technology*"

***Automatic Control, Computer Models***

1. Boolean algebra, combinatorial logical function design
2. Design of sequential logical control functions, flip-flop unit application
3. Programmable controller structure, methods of programming
4. On-off control, control oscillations, dependence on the loading effects
5. Linear continuous controllers of P, PI, PD and PID actions, offset rejection, the role of I and D actions
6. Static characteristics of the plant and their linkage
7. Linearization in the plant model, superposition in linear models
8. Laplace transform, basic rules for application. Transform solution of linear differential equations.
9. Linear continuous dynamic system and its L-transform representation. Step and impulse response
10. L-transform transfer function, block algebra of transfer functions
11. System identification, approximation of higher order systems by FOPDT (First Order Plus Dead Time) models
12. Second order systems, overshoots, damping ratio, natural frequency, damped natural frequency, complex poles
13. Forced oscillations, frequency response and frequency transfer function of a linear plant, Bode diagram and complex plane representation
14. Characteristic equation and characteristic polynomial of a linear control circuit of a linear system, the meaning of the roots of characteristic equation
15. Stability of linear continuous control circuit, stability criteria, the system behaviour on the stability boundary
16. Adjustment of PID controller parameters according the Ziegler-Nichols rule
17. Digitization of PID controllers, windup effect
18. Quality evaluation of control process