**Exam questions edited**

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| --- | --- |
| 1. | Write about signals and blocks in Simulink modeling systems. |
| 2. | Represent changing states of Stateflow diagram that represents plans for a trip.  |
| 3. | Solve the following equation in Simulink $\ddot{q}+k^{2}\*q= \frac{F}{a}$, F = H\*sin (w\*t).

|  |  |  |  |
| --- | --- | --- | --- |
| *H* | *w* | *k* | *а* |
| 2 sm | 0,3 *s-1* | 0,4 *s-1* | 1 *s-2* |

  |
| 4. Describe continuous and discrete states in Simulink models. Give examples of blocks that represent these states.  |
| 5. Represent changing states of Stateflow diagram that describes changing temperatures in houses |
| 6. Solve the following equation in Simulink $\ddot{q}-k\*q= \frac{F}{a}$, F = H\*cos (w\*t). (34

|  |  |  |  |
| --- | --- | --- | --- |
| *H* | *w* | *k* | *а* |
| 2 sm | 0,7 *s-1* | 0,4 *s-1* | 1 *s-2* |

7. Work with MATLAB. Write about such elements of the Simulink library as an add, gain, sine wave and switch.8. Describe creation of Sub-blocks in Simulink modeling tool. Write about the work of sub-systems.9. Solve the following equations using Simulink tools. $\ddot{b}+60\*b= Q+7$, where Q is equal to $Q=\sin(\left(wt\right)), w=10$ (34 балл) |

10. Work with MATLAB. Write about such elements of the Simulink library as an integrator, derivative and unit delay.

11. Describe triggered systems. Write about subsystems with rising, falling and rising or falling triggers.

12. Solve the following equations using Simulink tools. $\ddot{a}+5\*a= N+7$, where N changes its value from 5 to 10 after 15 seconds from the start.

13. Write about Data types in Simulink. Describe data types that are commonly used in systems.

14. Solve the following equation in Simulink 

|  |  |  |  |
| --- | --- | --- | --- |
| *A*  | *w1* | *l*  | ϕ*0* |
| 2 m | 3 *s-1* | 40 m | 0.1° |

15. Describe an integrator block in Simulink, its purpose and work.

16. Describe Stateflow diagrams. Analyze a meaning of states in systems.

17. Solve the following equation in Simulink . Every 10 seconds, the value of A changes by ± 1.

|  |  |  |  |
| --- | --- | --- | --- |
| *A*  | *w1* | *l*  | ϕ*0* |
| 4 m | *5 s-1* | 30 m | 2° |

18. Describe an integrator block in Simulink, its purpose and work.

19. Describe Stateflow diagrams. Analyze a meaning of states in systems.

20. Solve the following equation in Simulink . Every 10 seconds, the value of A changes by ± 4. (34 балл)

|  |  |  |  |
| --- | --- | --- | --- |
| *A*  | *w1* | *l*  | ϕ*0* |
| 6 m | *2 s-1* | 15 m | 1° |

21. Describe an integrator block in Simulink, its purpose and work.

22. Write about the work of an integrator in Simulink. Describe zero-crossing signals: rising, falling and either.

23. Solve the following equation in Simulink . Every 10 seconds, the value of A changes by ± 4.

|  |  |  |  |
| --- | --- | --- | --- |
| *A*  | *w1* | *l*  | ϕ*0* |
| 6 m | *2 s-1* | 15 m | 1° |

24. Write about the work of mathematics blocks in Simulink modeling tool. Describe a sum, product and gain blocks in details.

25. Draw Stateflow diagram, describe states and transition of states in the system.

26. Solve the following equation in Simulink . C is the rigidity of the elastic suspension. Let c = 0.5 kg / s2.

|  |  |  |
| --- | --- | --- |
| *m*  | *V* | *А1* |
| *0.7 kg*  | *0.9 m/s* | * 1. *m*
 |

27. Work with MATLAB. Write about such elements of the Simulink library as an add, gain, sine wave and switch.

28. Represent changing states of Stateflow diagram that represents the work of a traffic light.

29. Solve the following equation in Simulink $m\_{1}\ddot{x}\_{1}+\left(c\_{1}+c\_{2}\right)x\_{1}-c\_{2}x\_{2}=0,$

$$m\_{2}\ddot{x}\_{2}+c\_{2}x\_{1}-c\_{2}x\_{2}=0 $$

|  |  |  |  |
| --- | --- | --- | --- |
| m1 | m2 | c1 | c2 |
| 2 kg | 3 kg | 5 kg/s2 | 1. kg/s2
 |

30. Write about the work of an integrator in Simulink. Describe zero-crossing signals: rising, falling and either.

31. Describe a creation of subcharts in Stateflow diagrams. Write how conditions in transitions between states work.

32. Solve the following equation in Simulink . Every 10 seconds, the value of A changes by ± 1.

|  |  |  |  |
| --- | --- | --- | --- |
| *A*  | *w1* | *l*  | ϕ*0* |
| 4 m | *5 s-1* | 30 m | 2° |

33. Write about the term automation and give examples of different kinds of automation processes.

34. Draw a scheme combining elements from Stateflow and Simulink diagrams. Stateflow has to include input and output signals.

35. Solve the following equation in Simulink . Every 10 seconds, the value of A changes by ± 4.

|  |  |  |  |
| --- | --- | --- | --- |
| *A*  | *w1* | *l*  | ϕ*0* |
| 6 m | *2 s-1* | 15 m | 1° |

36. Describe Simulink tool of modeling, its advantages in the modeling processes.

37. Describe a connection of Stateflow charts with Simulink blocks. Write how input and output signals are created.

38. Solve the following equation in Simulink . Every 10 seconds, the value of A changes by ± 4.

|  |  |  |  |
| --- | --- | --- | --- |
| *A*  | *w1* | *l*  | ϕ*0* |
| 6 m | *2 s-1* | 15 m | 1° |

39. Modeling methods for complex systems. Describe mathematical and descriptive models. Give examples.

40. Write about conditional control flow statements. Give examples of (If…else) and (Switch) statements.

41. Solve the following equation in Simulink . C is the rigidity of the elastic suspension. Let c = 0.5 kg / s2.

|  |  |  |
| --- | --- | --- |
| *m*  | *V* | *А1* |
| *0.7 kg*  | *0.9 m/s* | * 1. *m*
 |

42. Describe a system’s modeling. Write about main advantages of using models.

43. Describe triggered systems. Write about subsystems with rising, falling and rising or falling triggers.

44. Solve the following equation in Simulink . C is the rigidity of the elastic suspension. Let c = 2 kg / s2.

|  |  |  |
| --- | --- | --- |
| *m*  | *V* | *А1* |
| *0.9 kg*  | *2 m/s* | *0.5 m* |

45. Describe a system’s modeling. Write about main advantages of using models.

46. Describe robotic system toolbox in MATLAB. Write about various kinds of robots that could be built there.

47. Solve the following equation in Simulink . C is the rigidity of the elastic suspension. Let c = 2 kg / s2.

|  |  |  |
| --- | --- | --- |
| *m*  | *V* | *А1* |
| *0.9 kg*  | *2 m/s* | *0.5 m* |

48. Describe the term System and Subsystem. Draw a scheme that represents Supersystem, System and Subsystem.

49. Describe robotic system toolbox in MATLAB. Write about various kinds of robots that could be built there.

50. Solve the following equation in Simulink $m\_{1}\ddot{x}\_{1}+\left(c\_{1}+c\_{2}\right)x\_{1}-c\_{2}x\_{2}=0,$

$m\_{2}\ddot{x}\_{2}+c\_{2}x\_{1}-c\_{2}x\_{2}=0 $

|  |  |  |  |
| --- | --- | --- | --- |
| m1 | m2 | c1 | c2 |
| 2 kg | 3 kg | 5 kg/s2 | 1. kg/s2
 |

51. Write about the work of mathematics blocks in Simulink modeling tool. Describe a sum, product and gain blocks in details.

52. Describe creation of Sub-blocks in Simulink modeling tool. Write about the work of sub-systems.

53. Create Stateflow diagram that simulates a control of temperature in an industrial oven.

54. Write about the work of an integrator in Simulink. Describe zero-crossing signals: rising, falling and either.

55. Describe the concept Internet of things (IoT). Write about smart systems.

56. Describe Stateflow diagram that realizes your schedule of everyday activities. Use charts and subcharts.

57. Write about robotics systems toolbox. Describe trajectory planning and obstacles avoidance done by moving robots.

58. Describe the concept Internet of things (IoT). Write about smart systems.

59. Create Stateflow diagram that simulates a control of temperature in the house.