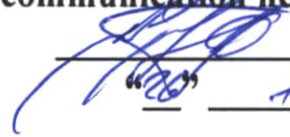


“APPROVED”

**Head of department of “Data
communication networks and systems”**

D.T.Khasanov


“12” 12 2024 y.

**Tashkent University of Information Technologies named after Muhammad al-
Khwarizmi**

**Faculty of “Telecommunication Technologies”
Department of “Data communication networks and systems”**

**Final Control quizzes for 4th year students of the fall semester of the
2024/2025 academic year by subject of “Modeling and Simulation of
Networks”**

1. Application of modeling in designing telecommunication systems and its role.
2. Conceptual model of the system and network of information transmission.
3. Binomial model of the communication channel.
4. Model of the Gilbert communication channel.
5. Noise immunity of the QAM modulation methods.
6. Noise immunity of the QPSK modulation method.
7. Efficiency of signal-code structures.
8. Models of the protocol of random to the common communication channel.
9. Model of the CSMA/CD protocol.
10. Model of the CSMA/CA protocol.
11. Models of broadband access networks.
12. Models of access protocols to radio channels in modern wireless networks.
13. Models of data transmission protocols.
14. Models of data flows.
15. Model of a single-channel Queueing system with an unlimited queue.
16. Model of a single-channel Queueing system with a limited queue.
17. Model of a multi-channel Queueing system with an unlimited queue.
18. Model of a multi-channel Queueing system with limited memory.
19. Model of a priority Queueing system.
20. Model of servicing queues on network nodes.
21. Model of managing data flows in network nodes.
22. Model of a data transmission network.
23. Model of IntServ.
24. Model of DifServ.
25. Models of mechanisms for ensuring QoS in the control plane.
26. Models of mechanisms for ensuring QoS in the data plane.
27. Models of mechanisms for ensuring QoS in the administrative plane.
28. Model of a "leaky bucket" of data flow management.

29. Model of traffic management Token Bucket.
30. Model of RED.
31. Model of ARED.
32. Model of servicing with a priority queue.
33. Model of servicing with a weighted fair queue.
34. Parameters and characteristics of queueing networks.
35. Laws and parameters of distribution of random numbers.
36. Laws of density and distribution functions of random numbers.
37. Analysis problems in network modeling.
38. Synthesis (optimization) problems in network modeling.
39. Model of the simplest flow.
40. Types of mathematical modeling.
41. Model M/G/1.
42. Model G/G/1
43. Model of relative priority of Queueing system.
44. Model of absolute priority of Queueing system .
45. Conservation law in priority of Queueing system.
46. Models of data transmission protocols.
47. Distribution function of a random variable.
48. Principle of calculating the probability of error in a data frame.
49. Problems of ensuring QoS in traditional routing methods.
50. Routing model of flows based on minimizing the maximum limit of transmission channel bandwidth use.
51. Routing model based on minimizing the average flow delay in the network.
52. Routing model based on minimizing the average flow delay in the network.
53. Routing model based on minimizing the maximum queue length in network nodes.
54. How to determine the average delay time in multipath flow routing.
55. Conditions for maintaining a flow in multipath routing.
56. Conditions for preventing high loads in multipath routing.
57. Fundamentals of solving multipath routing problems using Matlab Optimization Toolbox functions.
58. Methods for ensuring QoS requirements in multipath flow routing.
59. Model for building a software-defined network based on Open SDN.
60. Software-configurable model for building a network based on an existing API.
61. Model for building a software-defined network based on an overlay network and a hypervisor.
62. The structure and operating principle of an OpenFlow switch.
63. The structure and operating principle of an SDN controller.
64. OpenFlow switch model based on Queueing system.
65. SDN controller model based on Queueing system.
66. SDN network model based on Queueing system.

67. Fundamentals of SDN network modeling in AnyLogic environment.
 68. Structure and areas of application of wireless sensor networks.
 69. Areas of application of Internet of Things technologies.
 70. Main types of traffic in 5G networks.
 71. General methods of channel access in mMTC (M2M).
 72. Traffic models for mMTC (M2M).
 73. Areas of application of mMTC (M2M).
 74. In the M/M/1/4 type of Queueing system, requests are received at intervals of 2 minutes. The request servicing time is 50 sec. Determine the request waiting time.
 75. For the M/U/2/4 type of Queueing system, develop a simulation program in GPSS.
 76. In the M/M/1/ type of Queueing system, 3 requests are received per second. The intensity of request servicing per second is 15 requests. Determine the average request delay.
 77. For the D/M/3/5 type of Queueing system, develop a simulation program in GPSS.
 78. In the M/M/1/0 type of Queueing system, 4 requests are received per second. Service rate is 12 requests/sec. Determine the probability of request loss.
 79. Develop a GPSS simulation program for D/D/3/6 type Queueing system.
 80. M/M/1/3 type Queueing system receives 3 requests per second. Request service rate is 15 requests/sec. Determine the average number of requests in the system.
 81. Develop a GPSS simulation program for D/U/2/4 type Queueing system.
 82. M/M/1/2 type Queueing system receives requests every 1 minute. Request service time is 50 sec. Determine the probability of request loss.
 83. Develop a GPSS simulation program for U/M/3/7 type Queueing system.
 84. Develop a GPSS program:
Incoming flow - exponential
Service time distribution - deterministic
Non-priority service discipline
Number of service channels - 5
Buffer size - unlimited
 85. Develop a program in GPSS:
Incoming flow - uniform
Service time distribution - exponential
Non-priority service discipline
Number of service channels - 1
Buffer size - unlimited
Table formation - by delay time.
 86. Develop a program in GPSS:
Incoming flow - exponential
Service time distribution - arbitrary
Priority service discipline
-

Number of priorities - 2

Number of service channels - 1

Buffer size - unlimited

87. M/M/1/0 receives 7 requests per second. Service rate is 12 requests per second. Find the probability of request loss.

88. M/M/1/2 receives requests with an interval of 2.2 minutes. Request service time is 50 seconds. Find the probability of request loss.

89. M/M/1/0 receives 16 requests per second. Request service time is 20 requests per second. Find the channel idle coefficient.

90. Write a program to simulate M/M/2/4 in GPSS.

91. Write a program to simulate M/D/1/3 in GPSS.

92. Write a program to simulate M/U/2/4 in GPSS (U-Uniform, uniform distribution).

93. Write a program to simulate D/M/3/5 in GPSS (D fixed, deterministic)

94. Write a program to simulate D/D/3/6 in GPSS (D fixed, deterministic)

95. Write a program to simulate D/U/2/4 in GPSS (U-uniform distribution).

96. Write a program to simulate U/M/3/7 in GPSS (U-Uniform, uniform distribution).

97. Create a program to simulate U/D/1/3 in GPSS (D constant, deterministic).

98. Write a program for simulating U/U/2/4 in the GPSS environment (U-Uniform, uniform distribution).

99. Write a program for simulating M/M/4/3 in GPSS for the M/M/4/3 system.

100. The Queueing system receives 5 requests per second. The service intensity is 2 requests per second. The average number of requests in the system is 8. It is necessary to determine the average delay time of requests in the system.

Responsible teacher



A.A.Qodirov