“APPROVED”
Head of department of “Data communication networks and systems”
_____________ D.T.Khasanov
“26” __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 3th year students of the fall semester of the 2024/2025 academic year by subject of “Information and coding theory”

1. The role of information theory and coding in modern global infrastructure. Basic concepts and terms (information, message, signal).
2. Structural diagram of the discrete message transmission system.
3. Conceptual model of a modern info-communication network.
4. Requirements for data transmission service.
5. Quality of service indicators in data transmission systems.
6. Requirements for quality of service in data transmission systems.
7. Information characteristics of the source of discrete messages.
8. Classification of discrete sources.
9. What is cyclic redundancy code (CRC)?
10. Entropy of the source of discrete messages.
11. Redundancy and productivity of the source of discrete messages
12. Mutual and conditional information and their characteristics.
13. Shannon's theorem for a message source.
14. Information coding methods.
15. Information coding using the Shannon-Fano method.
16. Information coding using the Huffman method.
17. Using efficient coding methods.
18. Text compression.
19. Audio message compression.
20. Video message compression.
21. Lossy information compression methods.
22. Lossless information compression methods.
23. Dictionary compression methods.
24. Compression algorithms in modern modems.

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**