PEOPLES´ FRIENDSHIP UNIVERSITY OF RUSSIA NAMED AFTER PATRICE LUMUMBA
RUDN UNIVERSITY
Tests for RUDN University Open Olympiad for Foreign Citizens
COMPUTER SCIENCE(M)
Variant 2

1. 2 Relations R1(Batch code, Last name, City) and R2(Batch code, Last name, City) are given. Find the cardinal number (relationship cardinality) of the ratio R, where $R = R_1 \cup R_2$.

R1

Batch Code	Last Name	City
302	Ivanov	Tula
303	Petrov	Moscow
301	Lebedev	Kursk
302	Zaitsev	Kazan

R2

Batch Code	Last Name	City
304	Sidorova	Kerch
303	Ivanova	Rostov
301	Lebedev	Kursk
302	Petrov	Moscow

a) 7

b) 8

c) 6

d) 0, as these relations cannot be combined.

2. Match the terms:

1 Super Key	A A set of relation attributes of minimal size which uniquely identify a tuple.
2 Primary Key	B Represents one of the candidate keys chosen to uniquely identify tuples of a given relation.
3 Candidate Key	C A subset of the set of relation attributes which satisfies the uniqueness requirement.

a) 1) A; 2) B; 3) C.

b) 1) B; 2) C; 3) A.

c) 1) A; 2) C; 3) B.

d) 1) C; 2) B; 3) A.

3. Which of the following statement(s) is/are NOT a property of relations?

a) There are no identical tuples in a relation.

b) Duplicate tuples are not included when merging relations.

c) The attributes of a relation are not ordered in any way.

d) The values of all attributes are atomic.

4. To which of the following groups do the SELECT, INSERT, UPDATE, DELETE commands belong?

a) Data Definition Language.

b) Data Control Language.

c) Data Manipulation Language.

d) Transaction Control Language.

5. A company has a table called STAFF in its database. Below is a sample from this table. An analyst needs to calculate the maximum salary of employees from department 15 based on this sample. Choose the correct option.

STAFF

Id	Name	Dept	Job	Years	Salary
10	Sanches	15	Sales	5	13556.50
12	Henry	32	Mgr	3	18352.80
24	James	44	Sales	10	16806.70
35	Mary	15	Clerk	NULL	10505.90
46	Williams	32	Mgr	6	22959.20
50	July	15	Clerk	4	12258.50

a) SELECT AVG(Salary) FROM STAFF WHERE Dept = 15

b) SELECT MIN(Years) FROM STAFF WHERE Dept = 32

c) SELECT SUM(Salary) FROM STAFF WHERE Dept = 44

d) SELECT MAX(Salary) FROM STAFF WHERE Dept = 15

6. Which of the following is NOT the main task of the operating system:

a) Ensuring interaction between applications and computer hardware.

b) Organizing a user-friendly interface.

c) Ensuring interaction between applications.

d) Distributing software and hardware resources of the system.

7. Choose the correct option to fill in the blanks with the corresponding terms:

"Speaking about the principle of _____, there is not only the organization of the division of those resources between computing processes which should not be divided, but also abstraction from specific resources, maximum generalization of their properties and work with some abstraction which has absorbed the most significant features.

According to the principle of _____, an operating system is built from many software modules - functionally complete elements of the system implemented in accordance with the accepted intermodule interfaces.

In its turn, the principle of _____ is a desired property for any multi-user system. Security rules define such properties as protecting the resources of one user from others and establishing quotas for resources to prevent one user from capturing all system resources (e.g., memory)."

a) Virtualization, modularity, computing security.

b) Mobility, generator, openness.

c) Computing security, compatibility, virtualization.

d) Generator, mobility, modularity.

8. Match the notions:

1 Exception	A Command instructions used by user processes to call system functions.
2 Interval Timer Interrupt	B Hardware signal caused by an error.
3 Software-Generated Interrupt	C Signal issued by a device when it has finished servicing an I/O request.
4 I/O Completion Interrupt	D

	Signal issued by an interrupt timer when the time quantum allocated to the process has expired.

a) 1) C; 2) D; 3) B; 4) A.

b) 1) D; 2) C; 3) A; 4) B.

c) 1) A; 2) C; 3) B; 4) D.

d) 1) B; 2) D; 3) A; 4) C.

9. Choose the correct statement(s):

a) The virtual address space of a process is the same as the physical address space of the system.

b) Internal fragmentation occurs in paged virtual memory systems.

c) External fragmentation may occur in segmented virtual memory systems.

d) Both external and internal fragmentation are commonly found in segmented-paged virtual memory systems.

10. Which of the following does NOT involve formatting a drive?

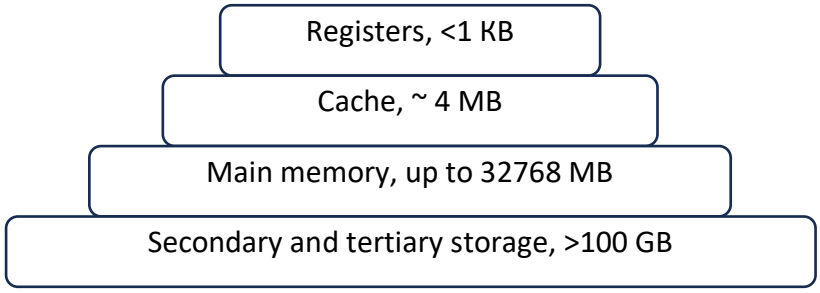
a) Recovering a damaged superblock from a copy.

b) Checking the drive for non-working areas.

c) Erasing previously stored data on the drive.

d) Creating a root directory on the drive.

11.



What type(s) of memory in the presented system hierarchy can the processor directly access?

a) All except secondary and tertiary storage.

b) Only registers.

c) All.

d) Registers and cache.

12. Determine the class of computer networks which meet the following criteria:

High speed of information transfer.	Effective mechanism for managing network exchange.
Low level of transmission errors.	Number of computers connected to the network clearly limited in advance.

a) Metropolitan area network (MAN).

b) Local area network (LAN).

c) Wide area network (WAN).

d) Virtual private network (VPN).

13. Which service(s) is/are NOT provided by network protocols?

a) Addressing and routing information.

b) Reliable data transport between computers.

c) Error checking.

d) Establishing rules for interaction in a particular network environment.

14. Choose the local network topology for which the corresponding signs are specified correctly:

	Star	Ring	Bus
Access method	Access and control through a central node.	Access from node to node.	Centralized and decentralized access.
Reliability	Failure of the central node — failure of the entire system.	Failure of the workstation or cable break —failure of the entire system.	Failure of the workstation or cable break — failure of the entire system.
Scalability	Unlimited.	Unlimited but with an increase in response time.	Limited by the cable length.

a) Ring.

b) Bus.

c) Star.

d) Mesh.

15. What layer of the TCP/IP model protocol header is shown below?

0										1										2									3	
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1
Source port																Destination port															
Length																Checksum															

a) Network interface layer.

b) Application layer.

c) Transport layer.

d) Internet layer.

16. What protocol(s) is/are used when building a VPN?

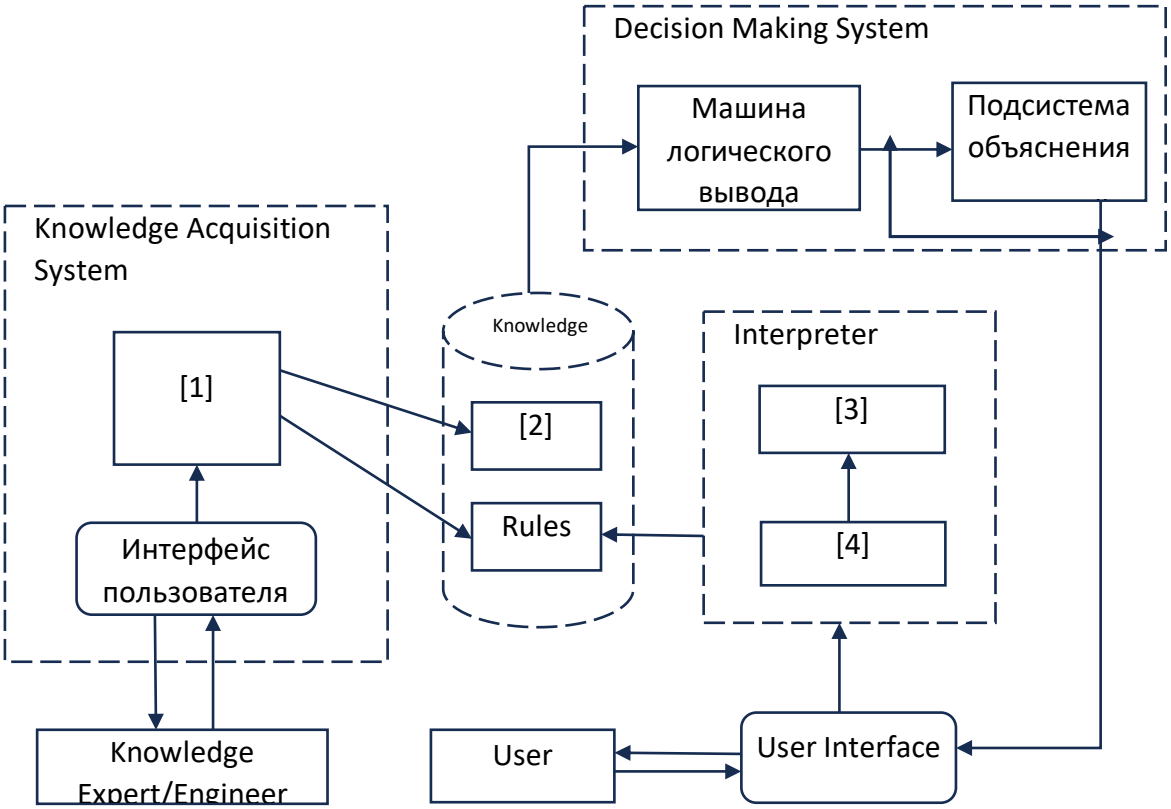
a) L2TP/IPsec.

b) SSL.

c) IKEv2.

d) HTTPS.

17.



Choose the correct option to fill in the blanks with the corresponding notions:

a) [1] Knowledge Identification/Acquisition;
[2] Data;
[3] Lexical Processor;
[4] Linguistic Processor.

b) [1] Data;
[2] Knowledge Identification/Acquisition;
[3] Linguistic Processor;
[4] Lexical Processor.

c) [1] Lexical Processor;
[2] Data;
[3] Knowledge Identification/Acquisition;
[4] Linguistic Processor.

d) [1] Linguistic Processor;
[2] Knowledge Identification/Acquisition;
[3] Data;
[4] Lexical Processor.

18. Match the classes of intelligent systems and the types identified within them:

1 Systems with Intelligent Interface	2 Self-Learning Systems
3 Expert Systems	4 Adaptive Information Systems

A	- intelligent databases; - hypertext systems; - cognitive graphics; - natural language interfaces; - contextual help systems.
B	- CASE-technology; - component technology.
C	- classifying; - redefining; - multi-agent; - transforming.
D	- neural networks; - data warehouses; - inductive systems; - precedent-based systems.

a) 1) D; 2) A; 3) B; 4) C.

b) 1) A; 2) D; 3) C; 4) B.

c) 1) A; 2) C; 3) D; 4) B.

d) 1) B; 2) A; 3) C; 4) D.

19. 2 numbers: $A = 13,3_8$ **and** $B = 12,1_4$ **are given. Calculate** $C = A \times B$.

a) $70,09375_{10}$

b) $5A,3_{12}$

c) $1001000,1_2$

d) $47,18_{16}$

20. Choose the statement which characterizes the *QUEUE* data type:

a) Composite data type; it represents a linear ordered set of similar elements and implements the LIFO principle.

b) Simple data type; it represents real numbers; it has a size of 8 bytes and is stored in computer memory in normalized form.

c) Composite data type; it represents a linear ordered set of similar elements and implements the FIFO principle.

d) Composite data type; it represents an indexed set of similar elements; the size is determined both statically and dynamically depending on the problem being solved and the elements being stored.