	Federal State-Funded Educational Institution of Higher Professional Education ***Volga State University of Technology***
	Entry Examination Scheme
	Higher Education – Bachelor Degree Program **Higher Education – Specialist Degree Program**

APRROVED BY
Rector of VOLGATECH
_____ I.V. Petukhov
"29" 10 2024

INFORMATICS ENTRY EXAMINATION SCHEME

Reviewed at the meeting of the Subject Examination Panel for Informatics and Bases of Informatics,
Minutes No. 1 of 29.10.2024

2024

	Position	***Full Name / Signature***	***Date***
Developed by	*Chairman of the Subject Examination Panel for Informatics and Fundamentals of Computer Science*	*/ A.V. Krevetsky*	29.10.2024
Agreed with	*Vice-Rector for the University Complex Development*	*/ A.A. Rozhentsov*	29.10.2024
Valid until re-approval			

INTRODUCTION

The program is designed for the applicants who achieved secondary general education grade and who are eligible to undertake general education entry examinations conducted by the university independently, in accordance with the current Rules for Admission to the Federal State-Funded Educational Institution of Higher Education Volga State University of Technology to study bachelor or specialist programs.

The scheme contains a list of the main topics recommended for preparation for the entry examination in Informatics, the demo-version of the exam paper (test paper), a marking scale for evaluating exam answers.

The exam paper contains 20 tasks to be completed within 60 minutes.

I. MAIN TOPICS IN INFORMATICS TO PREPARE FOR THE ENTRY EXAMINATION

1. Theoretical bases of informatics

The notion of informatics, information, information process.

The background for informatics origin and the history of its development.

Numbers, text, images and voice coding.

The volume of information measuring.

The units of data presentation, measuring and storing.

Filing system.

Arithmetical bases for computer building: Numerical systems. Numerical systems transformation. Operations with numbers in different numerical systems.

Logical bases for computers building: Boolean expressions. Logical operations. Methods of logical computations description.

2. Hardware for information processes implementation

Main stages of computers development. Computers generations.

Computers classification.

Computer design and operation principles.

Configuration and purpose of the main components of a personal computer, their properties.

3. Software for information processes implementation

Software classification.

Contemporary operational systems. Graphics interface elements. Windowing interface structure. Techniques of computer management with a mouse.

Filing system management programmes.

Text data processing software. Text cursor. Text entering and editing. Operating with blocks. Basic parameters of formatting fonts, paragraphs, pages. Lists.

Electronic tables. Assignment. Electronic table file structure. Data types. Cells ranges. Data input into cells and editing. Formulas. Ways of cells addressing in formulas. Standard functions.

Graphics editors. Their types.

Electronic presentations. Their purpose and facilities. Presentation structure. Animation effects. Modes of operation.

4. Basic principles of modelling

Modelling as a method of cognition.

Notions of "model", "information model", 'system", "model adequacy".

Variations of models.

Forms of information models representation.

5. Algorithmization and programming

Algorithmization: algorithm; ways of algorithm recording; main algorithmic structures: linear, branching, cycles.

Algorithms block diagrams reading.

Program. Main elements of programming languages: types of variables, variables, arrays, expressions, assignment operator.

Reading and analyzing a program in a high-level language or pseudo language.

Programming process. Programming systems. Main elements of programming systems. Compilers and interpreters.

6. Data bases

Data bases. Data base management systems. Tasks handled with data bases.

Operating regimes with data bases. Data base objects: tables, cross table relationships, queries, log reports, forms.

Main operations with data bases.

7. Computer networks

Computer network notion. Difference between local and global networks.

Soft and hard components of computer networks.

Internet resources addressing.

Internet services.

8. Basic principles of information security

Types of information threats.

Methods of data securing against unauthorized access.
Protection against malicious programs.

References

1. Makarova N.V., Kochurova Ye.G., Nikolaychuk G.S., Nilova Yu.N., Nitova Yu.F. Informatics. Parts 1 (theory) and 2 (practical training). – St Petersburg: "PITER", 2012.

2. Semakin I.G., Sheina T.Yu., Shestakova L.V. Informatics and ICT. – M.: "BINOM. Knowledge laboratory", 2012.

3. Ugrinovich N. D. Informatics and ICT. – M.: "BINOM. Knowledge laboratory", 2009.

4. Kushnirenko A.G. et al. Bases of informatics and computers. / Study guide for 10-11th forms. – M.: Prosveshcheniye, 1997.

5. Kushnirenko A.G. et al. Information culture. / Study guide for 9-10th forms. – M.: Drofa, 1997-1999.

II. EXAMINATION PAPER (TEST) STRUCTURE

Topic	*Number of questions*	*Min score*	*Max score*
1. Theoretical bases of informatics	5	0	25
2. Hardware for information processes implementation	2	0	10
3. Software for information processes implementation	4	0	20
4. Basic principles of modelling	2	0	10
5. Algorithmization and programming	3	0	15
6. Data bases	1	0	5
7. Computer networks	2	0	10
8. Basic principles of information security	1	0	5
TOTAL	**20**	**0**	**100**

Ministry of Science and Higher Education of the Russian Federation
Volga State University of Technology
Test on Informatics
Task performance time – 60 minutes

Variant N 1

1. **Registered signals mean …**

a) information
b) data
c) symbols
d) codes
e) concepts

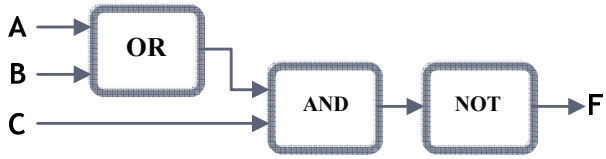
2. **Basic principles of computers were proposed by …**

a) Charles Babbage
b) George Boole
c) Norbert Wiener
d) Alan Turing
e) John von Neumann

3. **512 kilobytes of memory were allocated to store a 1024-1024 pixel bitmap image. Determine the maximum possible number of colors in the palette of this image.**

4. **Hexadecimal number 1C and binary number 1000 are given. Their sum in decimal notation is equal to ...**

5. **The structural formula for a logic circuit is of the form ...**



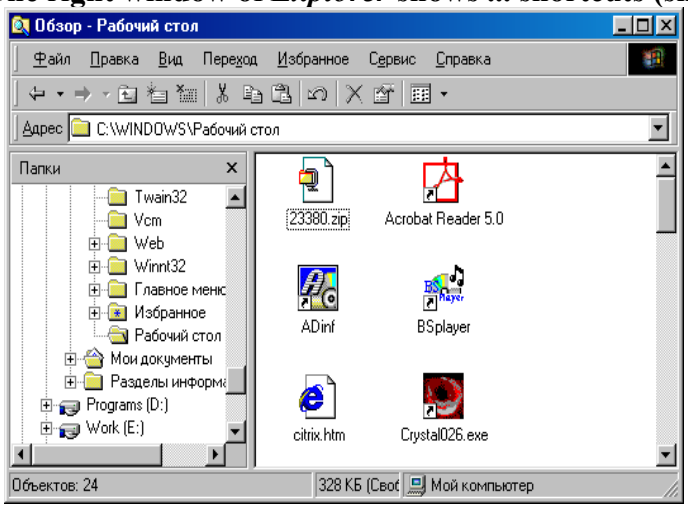
a) $\overline{(A \vee B \wedge C)}$;
b) $\overline{A} \wedge C \vee \overline{B}$;
c) $\overline{A} \vee C \vee \overline{B}$;
d) $\overline{(A \wedge C)} \vee \overline{B}$;
e) $\overline{(A \wedge C \vee \overline{B})}$

6. **Match the type of computers with their purpose.**

1) graphics station	a) development of commercials, computer video editing
2) file server	b) storage of information and providing access to it
3) network server	c) transmission of information in the network
4) on-board computer	d) control of orientation and navigation aids

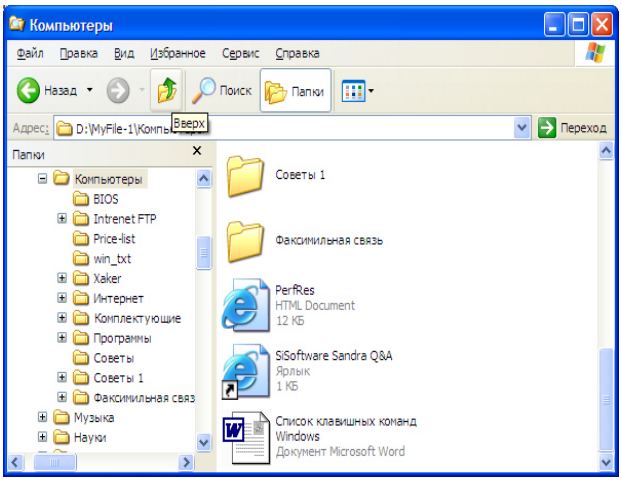
7. **Specify three devices that are placed on the motherboard.**
   a) processor
   b) power supply
   c) random access memory (RAM)
   d) read-only memory (ROM)
   e) hard disc (hard disc drive)

8. **The right window of *Explorer* shows ... shortcuts (shortcut)**



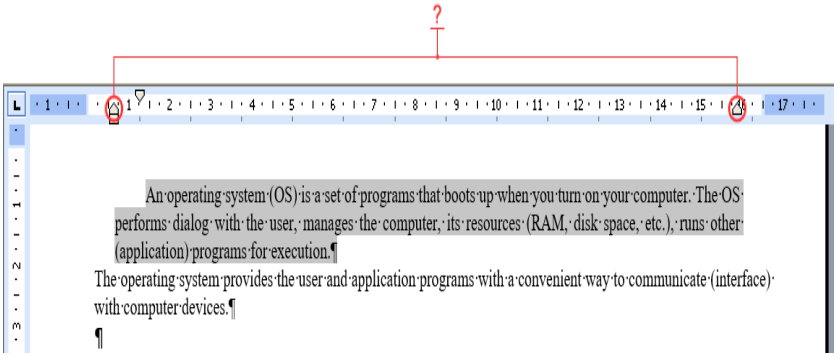
   a) one
   b) two
   c) three
   d) four
   e) six

9. **After clicking the left mouse button on the *Up* button...**



   a) the root directory of the *D* drive will be navigated to.
   b) the *Computers* folder will be moved to the top of the list.
   c) the *MyFile-1* folder will be opened.
   d) the *Tips 1* folder will be opened.

10. Using the labelled elements in MS Word ...



a) indents the first line of the selected text fragment.
b) sets the alignment of the paragraph to the page width.
c) sets the left and right margins for the selected text fragment.
d) splits the selected text fragment into two columns.
e) sets page parameters for printing the document.

11. A fragment of a spreadsheet is given. It is necessary to copy a formula from cell C2 to cells C3:C6 so that its copies still process cell D2. To do this most efficiently, you need to ...

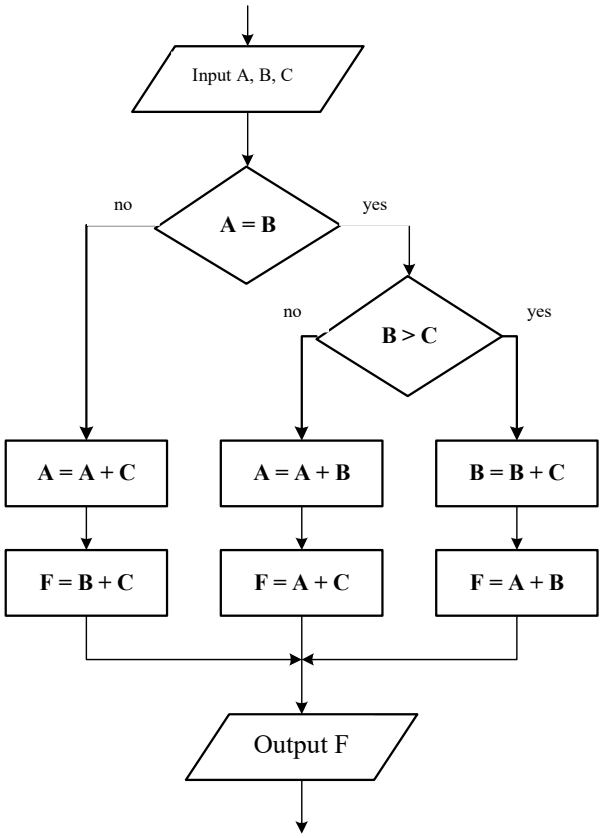
	A	B	C	D
1	Product code	Volume	Mass	Density
2	И22.14	4	=B2*D2	0,5
3	А67.21	6		
4	А67.33	2		
5	Т46.06	8		
6	И88.12	8		

a) protect cell D2 from changes and copy the formula to the correct cells.
b) use auto-replacement.
c) copy the formula into the necessary cells and edit each copy; replace address D2 in the original formula with address D2 and copy the formula to the required cells.

12. It is inappropriate to resort to modelling when ...
a) the modelling process is very slow.
b) the creation of the model is extremely expensive.
c) the essential properties of the object under study are not defined.
d) the study of the object leads to its destruction.

13. The main classes of models include ...
a) theoretical ones.
b) the ones of the subject area.
c) iconic (informational) ones.
d) systemic ones.

14. Use the flowchart to calculate the value of the variable F, if the initial values of variables A, B and C are 1, 1 and 3, respectively.



a) F=3
b) F-4
c) F=7
d) F=5
e) F=6

15. After executing the following program, the variable *n* takes the value *(a*b)/2*. This is possible with the following ratio of input variables.

Algorithmic language

```
alg example1 (рез вещ n)

init aim a,b,c
| input a,b,c

| n:=a

| k:=1
| if n>b
| | then n:=b; k:=k+1

| all

| if n>c
```

```
| | then n:=c

| all

| n:=((a*b*c)/n)/k

| output n
end
```

Turbo Pascal

```
program primer1;
var a,b,c,k: integer;
    n: real;
begin
  readln (a,b,c);
  n:=a;
  k:=1;
  if n>b then begin
     n:=b;
     k:=k+1;
  end;
  if n>c then n:=c;
  n:=((a*b*c)/n)/k;
  writeln ('n=',n:2:0);
end
```

Turbo Basic

```
rem example1
input a,b,c
n=a
k=1
if n>b then n=c:k=k+1
if n>c then n=c
n=()a*b*c)/n)/k
print n
end
```

a) c>b>a
b) b>c>a
c) a>b>c
d) a<b>c
e) b>c>=a

16. Determine the value of the variable *k* after executing the following program written in an algorithmic language (*mod* is a standard function that calculates the remainder from dividing the first argument by the second argument).

Algorithmic language

```
alg example1 (fin aim k)
init aim i
| k:=0;
| for i from 1 to 100
| ia
| | if (mod(i,3)=1) and (mod(i,5)=2)
```

```
| | | then k:=k+1
| | all
| кц
| output k
end
```

Turbo Pascal

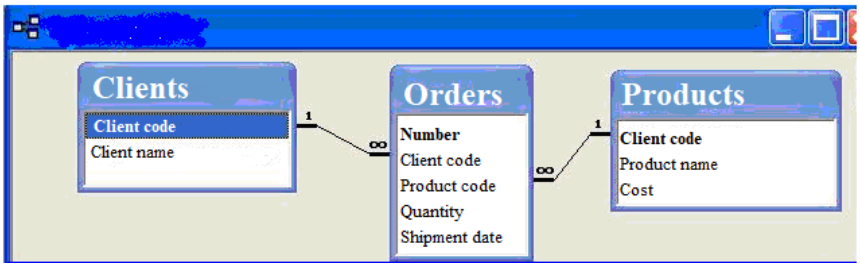
```
program primer1;
var k,i: integer;
begin
  k:=0;
  for i:=1 to 100 do
     if (i mod 3=1) and (i mod 5=2) then
        k:=k+1;
  writeln ('k=',k);
end.
```

Turbo Basic

```
rem example1
k=0
for i=1 to 100
If i mod 3=1 and i mod 5=2 then k=k+1
next i
print k
end
```

a) k=9
b) k=5
c) k=7
d) k=8
e) k=11

17. To visualize the relationships between tables, the ... is used.

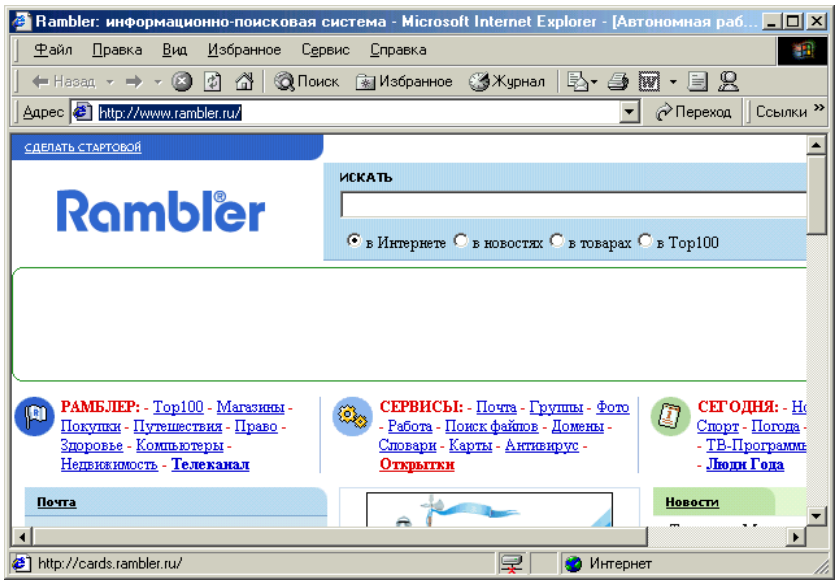


a) substitution list
b) condition on the value
c) data scheme
d) error message
e) default value

18. In the URL http://www.schools.keldysh.ru/faculty-it/info/ege.htm, the highlighted part of the URL stands for ....

a) the protocol to be used for communication with the remote computer.
b) the path to the local file on the remote computer.
c) the domain hierarchy in which this computer is located.
d) the geographical address of the remote computer.
e) the name of the local file on the remote computer.

19. The figure shows the window of the program type ...



a) browser.
b) Rambler.
c) opening the news page.
d) mail program.
e) word processor.

20. State *three* parameters by which computer viruses can be classified.

a) habitat
b) the way in which the habitat is infected
c) the volume of program code
d) features of the algorithm
e) the degree of non-dangerousness.