

Information units	Table of powers of number 2
1 bit – elementary unit	$2^0 = 1$
1B (Byte) = 8 bits	$2^1 = 2$ $2^9 = 512$
1KB (KiloByte) = 2^{10} B (1024 B)	$2^2 = 4$ $2^{10} = 1024$
1MB (MegaByte) = 2^{10} KB (1024 KB)	$2^3 = 8$ $2^{11} = 2048$
1GB (GigaByte) = 2^{10} MB (1024 MB)	$2^4 = 16$ $2^{12} = 4096$
1TB (TeraByte) = 2^{10} GB (1024 GB)	$2^5 = 32$ $2^{13} = 8192$
	$2^6 = 64$ $2^{14} = 16384$
	$2^7 = 128$ $2^{15} = 32768$
	$2^8 = 256$ $2^{16} = 65536$
Tick the programming language which you will use to perform the problems proposed in the topics II and III : ☐ Pascal ☐ C++	

Nr		Item	Score													
Topic I. (13 points)																
1	The self-service terminal allows the user to choose the desired service and receive a receipt with the order number in the queue. The order number at a single counter issued by the terminal is written on the receipt in the decimal system and is stored in the terminal memory in the 8-bit binary system. This number is reset every day. a) Calculate and write in the space reserved for the answer the largest number of applicants that a counter can have in a day. Write the used formula: _____ Write the calculations: _____ Answer: _____ b) Calculate and write in the space reserved for the answer the required volume of terminal memory, in KiloBytes, if the public service has 16 counters and stores the activity in memory for 256 working days. Write the used formula: _____ Write the calculations: _____ Answer: _____ KB c) It is known that the photo (<i>Image 1</i>) was processed by going from one state to another (monochrome to color or color to monochrome). At the beginning the photo was 45 MB, and after processing – 15 MB. Tick which was its initial state: ☐ color ☐ monochrome d) Join with segments the name of the equipment (column A) with its definition (column B): <table><tr><th>A</th><th>B</th></tr><tr><td>Decoder</td><td>device that converts binary words into messages</td></tr><tr><td>Modulator</td><td>device that converts messages into binary words</td></tr><tr><td></td><td>device that converts binary words into continuous signals</td></tr></table>	A	B	Decoder	device that converts binary words into messages	Modulator	device that converts messages into binary words		device that converts binary words into continuous signals	 Image 1	L 0 1 2 3 4 5 6 7 8 9 10 11 12 13	L 0 1 2 3 4 5 6 7 8 9 10 11 12 13				
A	B															
Decoder	device that converts binary words into messages															
Modulator	device that converts messages into binary words															
	device that converts binary words into continuous signals															
Topic II. (40 points)																
1.	Column A of the following table contains assignment statements in the Pascal language. Connect the statements in Column A with the data types in Column B using straight lines so that each variable on the left side of the assignment statement corresponds to a single data type, and the statements in Column A are written correctly. <table><tr><th>A</th><th>B</th></tr><tr><td>x := 34.5;</td><td>integer</td></tr><tr><td>y := 33 > 10;</td><td>real</td></tr><tr><td>z := trunc(x) + ord(y);</td><td>boolean</td></tr><tr><td>t := 'A';</td><td>array [1..2] of real</td></tr><tr><td></td><td>char</td></tr></table> Calculate and write the value of the variables after performing the assignment statements in the table above: y = _____ z = _____	A	B	x := 34.5;	integer	y := 33 > 10;	real	z := trunc(x) + ord(y);	boolean	t := 'A';	array [1..2] of real		char		L 0 1 2 3 4 5 6	L 0 1 2 3 4 5 6
A	B															
x := 34.5;	integer															
y := 33 > 10;	real															
z := trunc(x) + ord(y);	boolean															
t := 'A';	array [1..2] of real															
	char															

	Column A of the following table contains assignment statements in the C++ language. a) Connect the statements in Column A with the data types in Column B using straight lines so that each variable on the left side of the assignment statement corresponds to a single data type, and the statements in Column A are written correctly. <table><tr><th>A</th><th>B</th></tr><tr><td><pre>x = 34.5; y = 33 > 10; z = trunc(x) + int (y); t = 'A' ;</pre></td><td><pre>int float bool typedef float v[2] char</pre></td></tr></table> b) Calculate and write the value of the variables after performing the assignment statements in the table above: y = _____ z = _____	A	B	<pre>x = 34.5; y = 33 > 10; z = trunc(x) + int (y); t = 'A' ;</pre>	<pre>int float bool typedef float v[2] char</pre>		
A	B						
<pre>x = 34.5; y = 33 > 10; z = trunc(x) + int (y); t = 'A' ;</pre>	<pre>int float bool typedef float v[2] char</pre>						
2	a) The following image contains an expression written in the programming languages under study. Each operator and standard functions are accompanied by a cassette for entering data. Write in these cassettes the numbers that correspond to the order of execution of the operators and standard functions. If there are several correct solutions, present any of them. Pascal language: <code>abs (-4) + ord ((7 mod 2 = 1) and (5 > 2))</code> C++ language: <code>abs (-4) + int ((7 % 2 == 1) && (5 > 2))</code> b) Calculate and write the value of the given expression: _____	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8				
3	Let an integer variable x be given. Write a multiple branching statement that, depending on the value of the variable x, will display the season corresponding to the month number on the screen: Primavara, Vara, Toamna or Iarna. If the value of x does not correspond to the month number, display Error. <i>Note: the value 1 corresponds to January, 2 – February, etc.</i>	L 0 1 2 3 4 5 6 7	L 0 1 2 3 4 5 6 7				

4	Let the program p4 be given, from which some code sequences are omitted. Fill in the missing sequences so that the program reads the value of the legs of n right triangles and calculates the hypotenuse of each right triangle. The program will calculate and display the total perimeter of those triangles whose hypotenuse is greater than 4 and less than 10. Note: it is known that the value of n is equal to 5. <table><tr><th>Pascal language</th><th>C++ language</th></tr><tr><td><pre>program p4; var ____, n:integer; a, b, c, p:____; begin n := ____; p := 0; for i := ____ to n do begin read(____, b); ____:= sqrt(a*a + b*b); if (c > 4) ____ (c < 10) then p := p + a + ____ + c; end; write(____); end.</pre></td><td><pre>//program p4; #include <iostream> #include <cmath> using namespace std; int main(){ int ____, n =____; ____ a,b,c, p = 0; for (i =____; i <= n; i++) { cin>>____>> b; ____=sqrt(a*a + b*b); if (c > 4 ____ c < 10) p = p + a + ____ + c; } cout << ____; return 0;}</pre></td></tr></table>	Pascal language	C++ language	<pre>program p4; var ____, n:integer; a, b, c, p:____; begin n := ____; p := 0; for i := ____ to n do begin read(____, b); ____:= sqrt(a*a + b*b); if (c > 4) ____ (c < 10) then p := p + a + ____ + c; end; write(____); end.</pre>	<pre>//program p4; #include <iostream> #include <cmath> using namespace std; int main(){ int ____, n =____; ____ a,b,c, p = 0; for (i =____; i <= n; i++) { cin>>____>> b; ____=sqrt(a*a + b*b); if (c > 4 ____ c < 10) p = p + a + ____ + c; } cout << ____; return 0;}</pre>	L 0 1 2 3 4 5 6 7 8 9	L 0 1 2 3 4 5 6 7 8 9								
Pascal language	C++ language														
<pre>program p4; var ____, n:integer; a, b, c, p:____; begin n := ____; p := 0; for i := ____ to n do begin read(____, b); ____:= sqrt(a*a + b*b); if (c > 4) ____ (c < 10) then p := p + a + ____ + c; end; write(____); end.</pre>	<pre>//program p4; #include <iostream> #include <cmath> using namespace std; int main(){ int ____, n =____; ____ a,b,c, p = 0; for (i =____; i <= n; i++) { cin>>____>> b; ____=sqrt(a*a + b*b); if (c > 4 ____ c < 10) p = p + a + ____ + c; } cout << ____; return 0;}</pre>														
5	The Chisinau green spaces service bought decorative shrubs for the 5 city sectors. In order to create a unique composition, it was decided that the shrubs would be planted in areas with square surfaces of the same size of 9 shrubs arranged at the same distance from each to other (squares of 3 by 3 shrubs each). Task: write a program that will calculate and display for each city sector the number of square areas in which shrubs were planted and how many shrubs will need to be bought for the last area, in case there are not enough shrubs. Input: 5 integers will be read from the keyboard - the number of shrubs for each of the 5 city sectors. Output: 5 lines of 2 integers, separated by a space will be displayed– the number of areas planted with shrubs and the number of shrubs needed to be bought for the last planted area of each sector, if they are not enough. Example: <table><tr><th>Input</th><th>Output</th></tr><tr><td>90 46 32 54 210</td><td>10 0</td></tr><tr><td></td><td>6 8</td></tr><tr><td></td><td>4 4</td></tr><tr><td></td><td>6 0</td></tr><tr><td></td><td>24 6</td></tr></table>	Input	Output	90 46 32 54 210	10 0		6 8		4 4		6 0		24 6	L 0 1 2 3 4 5 6 7 8 9 10	L 0 1 2 3 4 5 6 7 8 9 10
Input	Output														
90 46 32 54 210	10 0														
	6 8														
	4 4														
	6 0														
	24 6														

Topic III. (22 points)				
1	Let the PASCAL program be given: <pre>program p1; var s:integer; function ps(x:integer):integer; begin if x>=700 then ps:= 1 else ps:= 0; end; type exam =record a, b, c:integer; end; var e: array[1..3] of exam; k , i:integer; begin k:=0; e[1].a:=700; e[1].b:=550; e[1].c:=890; e[2].a:=690; e[2].b:=870; e[2].c:=920; e[3].a:=950; e[3].b:=850; e[3].c:=800; for i := 1 to 3 do begin s:=ps(e[i].a)+ps(e[i].b)+ps(e[i].c); write(s, ' '); if s=3 then k := k+ 1; end; writeln; write(k); end.</pre>	Perform the following tasks for the program p1: a) Write the header of the ps function: _____ b) Write the name of the structured data type variable in the program p1:_____ c) Underline in the text of the program p1 the statement that contains the call of the ps function. d) Write the type of the formal parameter of the ps function: _____ e) Write the values of the current parameter for which the ps function returns the value 0: _____ f) Write the name of the global variable used in the program p1: _____ g) Tick the truth value for the statement: "<i>the ps function contains local variables</i>": ☐ True ☐ False h) Write what will be displayed as a result of executing the p1 program: _____ _____	L 0 1 2 3 4 5 6 7 8 9 10	L 0 1 2 3 4 5 6 7 8 9 10

	Let the C++ program be given: <pre>// Program p1 #include <iostream> using namespace std; int s; int ps(int x){ if (x>=700) return 1; else return 0; } int main(){ struct exam { int a, b, c; }; exam e[4]; int k = 0, i; e[1].a=700; e[1].b=550; e[1].c=890; e[2].a=690; e[2].b=870; e[2].c=920; e[3].a=950; e[3].b=850; e[3].c=800; for (i = 1; i <= 3; i++){ s=ps(e[i].a)+ps(e[i].b)+ps(e[i].c); cout << s << " "; if (s==3) k += 1; } cout << endl; cout << k; return 0;}</pre>	Perform the following tasks for the program p1: a) Write the header of the ps function: b) Write the name of the structured data type variable in the program p1 : _____ c) Underline in the text of the program p1 the statement that contains the call of the ps function. d) Write the type of the formal parameter of the ps function: e) Write the values of the current parameter for which the ps function returns the value 0: f) Write the name of the global variable used in the program p1: g) Tick the truth value for the statement: "the ps function contains local variables": ☐ True ☐ False h) Write what will be displayed as a result of executing the p1 program: _____ _____							
2	A survey was conducted for 9th grade students at the high school to determine what future graduates will choose after completing the gymnasium: - o real profile, coded by the letter R - o humanistic profile, coded by the letter U - o do not continue high school studies, choosing professional studies or others, coded by the letter A. The data is stored in the text file aleg2026.txt. Task: Write a program that will calculate how many students choose the real profile, how many students – the humanistic profile and how many students will not submit documents to high school. The program will contain a function named solve that receives as a parameter an integer value – the choice code. The function will calculate and return the number of students out of the total number of those participating in the survey who selected the specified value. Input: The text file aleg2026.txt contains in the first line an integer n - the number of students participating in the survey ($0<n\leq25$). The next n lines contain a code (R, U or A) – line i+1 specifies the choice of student i. Output: 3 integers will be displayed on the screen, accompanied by the message Real, Umanist or Altele, each on a new line – the number of students for each choice. example: <table><tr><th>aleg2026.txt:</th><th>Ecran:</th><th></th></tr><tr><td>6 R R U A U U</td><td>2 Real 3 Umanist 1 Altele</td><td>The solution will be appreciated for: types and variable declarations; operations with the text file; reading and writing data; algorithm organization.</td></tr></table>	aleg2026.txt:	Ecran:		6 R R U A U U	2 Real 3 Umanist 1 Altele	The solution will be appreciated for: types and variable declarations; operations with the text file; reading and writing data; algorithm organization.	L 0 1 2 3 4 5 6 7 8 9 10 11 12	L 0 1 2 3 4 5 6 7 8 9 10 11 12
aleg2026.txt:	Ecran:								
6 R R U A U U	2 Real 3 Umanist 1 Altele	The solution will be appreciated for: types and variable declarations; operations with the text file; reading and writing data; algorithm organization.							

[illegible]

Topic IV. (25 points)

- 1 A database was created in MS Access. Fragments of the content of the database tables are presented in *Image 2*:

Companie						
IdC	Denumire	Adresa	Telefon	Harta	Anul	
1	ABS	s. Colonita	022533998	http://abs.md	2006	
2	E-reciclare		022811414	http://e-reciclare.md/	2015	
3	I.M. Regia Autosalub	mun. Chisinau, str. 27 n	022746842	https://autosalubritate.md/	1945	
4	MoldRec	or. Chişinău, str. Indust	022999062	https://moldrec.md	2019	
5	E-Circular	str. 31 August 1989 – 12		https://e-circular.org	2010	

Comenzi						
Id	IdC	IdT	Data	Transport	Prenume	Contacte
1	1	4	12.01.2026	☐	Ion	069001212
2	2	10	20.01.2026	☒	Nicolae	067404040
3	1	10	03.02.2026	☒	Savva	061333333
4	4	3	10.02.2026	☐	Maria	022444444
5	4	2	12.02.2026	☒	Denis	027761346
6	3	6	13.02.2026	☒	Elena	021334353
7	3	11	16.02.2026	☒	Ion	061000201
8	1	11	16.02.2026	☒	Tudor	060223242
9	2	2	16.02.2026	☐	Natalia	026361347
10	2	3	17.02.2026	☒	Simion	023455555
11	3	5	17.02.2026	☐	Vasile	069640000

Reciclare	
IdT	TipReciclare
1	Sticle PET
2	Baterii auto
3	Baterii reîncărcabile
4	Baterii
5	Aluminiu
6	Carton
7	Telefoane mobile
8	Uleiuri de motor
9	Capacele de plastic
10	Aparate electrocasni
11	Plastic
12	Folie de plastic

Image 2

Based on the contents of the database table fragments in *Image 2*, complete the following tasks:

- a) The table below contains 3 data fields (column **A**). Check the table in column B that contains the relevant data fields. In column C, enter the data types that correspond to the fields (column **A**) in the checked table (column **B**):

A	B	C
Transport	☐ Companie ☐ Comenzi	
Data	☐ Companie ☐ Comenzi	
Harta	☐ Companie ☐ Comenzi	

- b) Tick:

- The data type of the **IdC** field in the **Comenzi** table is: ☐ Number ☐ Autonumber
- The table containing the foreign keys is: ☐ **Companie** ☐ **Reciclare** ☐ **Comenzi**
- The relationships between the **Companie** and **Reciclare** tables is:
☐ one-to-one ☐ one-to-many ☐ many-to-many
- The field **IdT** of the **Reciclare** table is: ☐ primary key ☐ foreign key

- c) The control element of the **Telefon** field in a form, presented in *Design View* mode is considered.

- Write in the reserved space specified by "____" the names of the 2 components of the control element in *Image 3*:

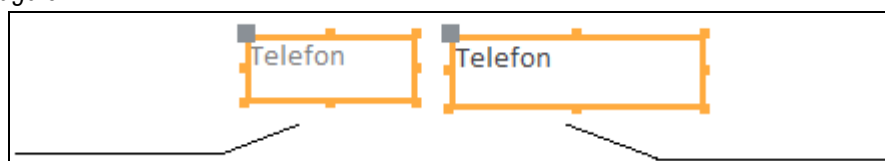


Image 3

- Tick the category of the control element, represented in *Image 3*:

☐ linked control element ☐ calculated control element ☐ independent control element

2

Using the database tables from *Image 2*, fill in *Image 4* with all the necessary elements, including the relationships between the tables, to define a query in *Design View*.

The query:

- Will display the data of 4 fields: **Denumire**, **Transport**, **TipReciclare** and **Data**.
- Will display the name of the company (**Denumire** field) that received orders for recycling batteries of any type (**TipReciclare** field) until March 1st of this year (**Data** field) and orders for recycling any type of plastic (**TipReciclare** field).
- The records will be sorted in descending order by the data in the **Denumire**.

Companie

*

IdC

Denumire

Adresa

Telefon

Harta

Anul

Comenzi

*

Id

IdC

IdT

Data

Transport

Prenume

Contacte

Reciclare

*

IdT

TipReciclare

Field:

Table:

Sort:

Show:

Criteria:

or:

Image 4

L

0

1

2

3

4

5

6

7

8

9

10

11

12

L

0

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