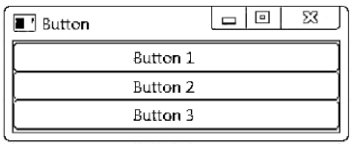
Virtual name
of answering:_____

National Technical University «Kharkov Polytechnic Institute»
with status of self-governing (autonomous) research national university
(Self-governing research NTU «KPI»)
Faculty « Computer technologies and programming » (CTP)
COMPETITION QUESTIONS
the second phase of All Ukrainian student's Olympiad
«System's programming»
April 7-10, 2010 for I tour (theoretical)
Mark the number of a right answer in each question:

№	The texts of a questions	Balls
1	Would the failure of one of the virtual machine host to other virtual machines? 1.1) yes, need to reinstall the host operating system; 1.2) yes, need to reinstall the guest operating systems; 1.3) failure of one virtual machine will not affect the work of other machines; 1.3) yes, need to reinstall all the virtual machines; 1.5) yes, need to reinstall the host and guest operating systems.	20
2	Below, using the terminal and nonterminal symbols, operations, OR (|) and generation (→) written grammar. Does this grammar inaccessible and non-producing characters? *1) I→write A; 2) I→writeln A; 3) A→(B) 4) A→$ 5) B→tC 6) B→iC 7) C→, B 8) C→$* 2.1) yes, it is an unattainable symbol C 2.2) yes, it is an unattainable symbol *B* 2.3) yes, it is a symbol of non-producing B and is a symbol of unattainable C 2.4) yes, it is a symbol of non-producing C 2.5) no, it does not	20
3	What determines the function (programming language C)? double f(double a, int b) { return b? b%2? a*f(a*a, b/2): f(a*a, b/2) :1; } 3.1) the greatest common divisor of *a* and *b* 3.2) the depth of a binary tree containing *a* node 3.3) the depth of *b*-ary tree containing *a* node 3.4) *b*-th power of *a* 3.5) value of *b*-day of Fibonacci	20
4	How important is the number if its representation in memory in the *float* format is (byte address increases from left to right): **00000000 00000000 00000000 00111111** ? 4.1) +0.125 4.2) +0.25 4.3) +0.5 4.4) +1.0 4.5) positive infinity	20
5	How many host addresses can be specified in the subnet: 5.1) 16 5.2) 2046 5.3) 2048 5.4) 4094 5.5) 4096.	20

6	Which brings the following function?
	unsigned int func1(unsigned int x) {x= (x & 0x55555555) + ((x >> 1) & 0x55555555);
	x= (x & 0x33333333) + ((x >> 2) & 0x33333333);
	x= (x & 0x0F0F0F0F) + ((x >> 4) & 0x0F0F0F0F);
	x= (x & 0x00FF00FF) + ((x >> 8) & 0x00FF00FF);
	x= (x & 0x0000FFFF) + ((x >> 16) & 0x0000FFFF); return x;}
	6.1) number, the order in which bits reversed; 6.2) checking of parity/odd;
	6.3) number of unit bits in binary numbers; 6.4) the initial value of x;
	6.5) number defining the number of x in the sequence of Gray codes.
		20

7	During work of COM-port on the transmission of single character of ASCII - code (code=200_{10} in format of byte) 0,36 milliseconds (мс) were expended at speed of transmission near to maximal and the included control on a parity. Specify, what time was expended in the transmission of one bit. 7.1) 0.045 мс 7.2) 0,036 мс 7.3) 0,03 мс 7.4) 0.04 мс 7.5) 0.05 мс	20
8	The result of the arithmetic operation $AE39_{15} - 433424_5$ with unsigned numbers is: 8.1) $6F2D_{17}$ 8.2) $CA95_{13}$ 8.3) 53112_8 8.4) 45332_6 8.5) 212201211_3	20
9	In a .xaml text file of WPF project it is written down: <Window x:Class="WindowsApplication1.Window1" xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation" xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml" Title="Window1" Height="200" Width="200"> </Window> A size is which will be in pixel windows with the header of Window1, created by it a .xaml file, if permission of monitor of user = 192 DPI? 9.1) 100x100 9.2) 192x192 9.3) 200x200 9.4) 400x400 9.5) a window will not be created	20
10	Resulted low text of the WPF project .xaml file is create a window (right pict.) with three horizontally located buttons: 1) <Window x:Class=" WindowsApplication2.Button" 2) xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation" 3) xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml" 4) Title="Button" Height="100" Width="250"> 5) <StackPanel> 6) <Button>Button 1</Button> 7) <Button>Button 2</Button> 8) <Button>Button 3</Button> 9) </StackPanel> 10) </Window>  In what line (lines) is it necessary to make alteration of text in for the vertical location of the buttons? 10.1) 1 10.2) 2,3 10.3) 4 10.4) 5 10.5) 6.7,8 10.6) 9,10	20
11	In .xaml file of WPF project it is necessary to declare the button with a text on it: "Click <Me&Fast>". What from the below indicated variants of declaration of such button will be correct (without error)? 11.1) <Button ...> "Click <Me&Fast>" </Button> 11.2) <Button ...> "Click <Me&Fast>" </Button> 11.3) <Button ...> " Click<Me&Fast>" </Button> 11.4) <Button ...> "Click <Me&Fast>" </Button> 11.5) <Button ...> "Click <Me&Fast>" </Button>	20
12	Fragment resulted below .xaml file of WPF project changes the width of the button on 5 units at every next pressure on it an user. What line is it necessary to delete in this text, that a changes width of the button was permanent after any amount of pressures on it? 1) DoubleAnimation widthAnimation = new DoubleAnimation(); 2) widthAnimation.From = 0; 3) widthAnimation.To = this.Width - 5; 4) widthAnimation.Duration = TimeSpan.FromSeconds (5) ; 5) cmdGrow.BeginAnimation(Button.WidthProperty, widthAnimation); 12.1) 1 12.2) 2 12.3) 3 12.4) 4 12.5) 5	20

13 What actions are executed by the fragment resulted below .xaml file of WPF project? 20

```
<EventTrigger RoutedEvent="Button.MouseEnter">
  <EventTrigger.Actions> <BeginStoryboard> <Storyboard>
    <DoubleAnimation Storyboard.TargetProperty="RenderTransform.Angle"
      To="360" Duration="0:0:1" RepeatBehavior="Forever" x/DoubleAnimation>
  </Storyboard> </Beginstoryboard> </EventTrigger.Actions>
</EventTrigger>
```

13.1) displaces representing the button from representing a mouse;
13.2) locks capacity of the button at appearance above it of mouse;
13.3) revolves constantly representing the pointer of mouse above the button;
13.4) revolves constantly the button at finding above it of mouse; 13.5) a code is not capable of working.

14 The fragment code of C language program is given for the POSIX-compatible operating systems: 20

```
... pid=fork();
  if(pid< 0) { printf("error!"); exit(1); }
  else if(pid==0) j++; ...
```

At successful implementation of the resulted fragment code a variable of *j* value will be increased
14.1) in a paternal process; 14.2) in daughter's process; 14.3) in paternal and in daughter's processes;
14.4) the variable of *j* will not be multiplied; 14.5) program completed with a code 1.

15 What part of the address space occupied by IP-addresses of class B and C combined (IPv4)? 20
15.1) 33,3% 15.2) 37,5% 15.3) 50,3% 15.4) 66,6% 15.5) 75,5%

16 That will be displayed as a result of execution of the program (C++ language, cout associated with the standard console)? 20

```
class A{public: virtual void print() { cout<<--a; } int a;};
class B : public A { public: B(int ia, int ib){b=ib;a=ia;} int b; virtual void print() { cout<<b++<<a++;}};
void main() { B b(1,2); A *pa = &b; B *pb = &b; pa->print(); pb->print(); }
```

16.1) 020 16.2) 210 16.3) 2132 16.4) 1223 16.5) 021

17 How will the sequence of processes p1 [0:6:3], p2 [2:2:0], p3 [6:7:0], p4 [0:5:1] (the first figure - the time of admission process in queue, the second - the time of its execution, the third - a priority (higher value means lower priority)), if the CPU time the scheduler runs, using preemptive priority scheduling? 20
17.1) p2→p3→p4→p1 17.2) p4→p2→p4→p3→p1 17.3) p4→p2→p4→p1→p3
17.4) p4→p2→p4→p3→p4→p1 17.5) p4→p1→p2→p3→p1

18 What will occur if attempting to compile and execute the program which contains C++ code (standard output stream is linked to standard console): 20

```
class One {public: One() { cout << 1; } One( long ) { cout << 2; } operator long () { cout << 3; return 0; }
                   int operator + ( long ) { cout << 4; return 0; } } o;
void main() { long x = 0; cout << o + x; cout << x + o << endl; }
```

As a result it will be displayed
18.1) 3030 18.2) 14030 18.3) 4030 18.4) 13030 18.5) Compilation error

19 What will occur if attempting to compile and execute the program which contains C++ code (standard output stream is linked to standard console): 20

```
class One {public: One( int ) { cout << 1; } operator int () { cout << 2; return 0; } };
void main() { const One one = 0; cout << 3 + one << endl; }
```

As a result it will be displayed
19.1) 123 19.2) 32 19.3) 13 19.4) 31 19.5) Compilation error

20 What will occur if attempting to compile and execute the program which contains C++ code (standard output stream is linked to standard console): 20

```
class One {public: One() { cout << 1; } virtual void f() { cout << 2; } };
class Two {public: Two() { cout << 3; } virtual void f() = 0; };
void main() { Two *two = (Two *)new One(); two->f(); }
```

As a result it will be displayed
20.1) 12 20.2) 132 20.3) 13 20.4) Compilation error 20.5) Runtime error

21 There are 3 processes (P1, P2, P3) and 3 types of resources (R1, R2, R3) in the operating system. A general number of resources of every type is in the system: R1=1, R2=2, R3=2. What current situation in the system is resulted in a table? 20

Process	Allocation			Requesting		
	R1	R2	R3	R1	R2	R3
P1	1	0	0	0	0	1
P2	0	0	1	0	1	0
P3	0	1	1	1	0	0

21.1) deadlock 21.2) deadlock-free 21.3) unsafe situation
21.4) unrealizable situation 21.5) starvation

22 A number is given A = -115.32_{10}. To define, what equals A_{16} in a format DD assembler x86 for a material number. 20
22.1) E6A3 D700h 22.2) E651 EB80h 22.3) C6A2 D000h 22.4) 6051 6800h 22.5) 42E6 A3D7h

23 To define content of register of ECX fragment of implementation of the masm32 program in assembler x86 language. 20

```
mas1 REAL8 129.235, -1024.01, -12.5, 5.06, 67895.025
len EQU $- mas1
...
mov ECX, len
shr ECX, 2
```

23.1) 0 23.2) 5 23.3) 20 23.4) 16 23.5) 10

24 To define the result of implementation of program fragment in assembler x86 language with the intrinsic functions of masm32. 20

```
a1 REAL10 1.7
...
invoke FpuMul,addr a1, 3, 0, SRC1_REAL or SRC2_DIMM or DEST_FPU
invoke FpuRound, 0, 0,SRC1_FPU or DEST_MEM
```

24.1) st(0)=5.1 24.2) st(3)= 5.1 24.3) st(0)=0 24.4) st(3)= 0 24.5) st(0)=5

25 To define the result of instruction of cyclic addition execution paddw two numbers of assembler x86 MMX commands family: number A = $30\ 000_{10}$, number B = $50\ 000_{10}$ 20
25.1) $20\ 000_{10}$ 25.2) $80\ 000_{10}$ 25.3) $65\ 536_{10}$ 25.4) $00\ 000_{10}$ 25.5) $14\ 464_{10}$

The maximal total balls for I tour: 500