HDU-ITMO Joint Institute
杭州电子科技大学 圣光机联合学院

COMPUTER BASICS
FINAL TEST
2022.03.26

Variant D

Section 1. Microprogramming (10 points)

1. What are the advantages of using CISC processors? (2 points)
2. For what purposes is a control unit used in processors? (1 point)
3. Using vertical and horizontal microinstruction we can do the same actions. Why the vertical microinstruction has less bits than horizontal? (2 points)
4. Assume that the subprogram is executed by using **JSR 4B8** instruction. What is in the 4B9 address? (1 point)
5. Write the codes of the control vertical and horizontal microinstructions for Basic Computer. These codes have to be able to check the seventh bit of the instruction register. If this bit equals 1, the control unit will jump to the address 53 in the microprogram memory. (2 points)
6. Write codes of the vertical microinstructions for Basic Computer that decrements the value of the accumulator by one (A = A-1). You can use several microinstructions. (2 points)

Section 2. I/O System Introduction (10 points)

1. What is a synchronous data exchange? For what purposes is it used? (1 points)
2. What is "Communication protocol"? Give an example (2 points)
3. Which interface requires less wires: simplex or semi duplex? Explain your answer. (2 points)
4. What will be added to the accumulator value after ADD 813 instruction execution? The initial value of the 013 memory cell is 0005. (2 points)
5. Write a program that reads the byte from the data register of ED3 of Basic Computer, subtracts it from the accumulator value and put the result into the 041 address in the memory. (3 points)

Section 3. Interrupt driven I/O (5 points)

1. What are the drawbacks of usage DMA? (1 point)
2. How a processor restores a program context during interrupt processing in Basic Computer? Please describe the process. (1 point)
3. Write the interrupt handler that reads the data from the ED2 data register, decrements it by 4 and stores the result in the 003 address in the memory. (3 points)

Section 4. Computer Graphics (10 points)

1. We have a hypothetical screen mode of 256x256 pixels. Some point has coordinates X=71 and Y =17. What is the byte address of this point in a row? What is the bit offset? What is a byte offset from the beginning of the video memory? Please explain your answer. (3 points)

2. Look at this code and say, what will be the value in EAX register. Please explain your answer. (3 points)

```
mov eax, 7
push eax
mov eax, 5
pop eax

add eax, 7
pop eax
```

3. What is the difference between "stdcall" and "invoke" in FASM? Give examples. (2 point)
4. What color models do you know? (2 point)

Section 5. Operating Systems (5 points)

1. What is a plugboard? For what purpose was it used? (2 point)
2. What is functions of operating systems? (3 point)