Xi'an Jiaotong-Liverpool University

西交利物浦大学

MODULE CODE	EXAMINER	DEPARTMENT	TEL
CPT101	STEVEN GUAN	COMPUTING	1501

1st SEMESTER 2021/22 Open-Book RESIT EXAMINATIONS

BACHELOR DEGREE – Year 2

COMPUTER SYSTEMS

TIME ALLOWED: 2 Hours

INSTRUCTIONS TO CANDIDATES

1、 **This is an open-book exam. Please tick the integrity disclaimer *immediately after you initiate the online open-book exam* and complete the assessment independently and honestly.**

2、 **Total marks available are 100.**

3、 **Answer all questions. There is NO penalty for providing a wrong answer.**

4、 **Only answers in English are accepted.**

5、 **The duration is *2 hours*. Where there are any major problems preventing you from continuing the exam or submitting your answers in time, please do not hesitate to email the Module Examiner (steven.guan@xjtlu.edu.cn) or Assessment Team of Registry (assessment@xjtlu.edu.cn).**

Answer All Questions

Part I. Each of the following questions comprises 5 statements, for which you should select the one most appropriate answer. Attempt all questions. The exam mark is based on the overall number of correctly answered questions; incorrectly answered questions do not count against you. Each question is worth 2.5 marks.

1.( ) The major difference between the von Neumann architecture and the Harvard architecture lies in

□ a) bus speed □ b) separated data from program □ c) CPU

□ d) use of secondary storage □ e) cache

2.( ) Which of the following will not lead to load-time error?

□ a) insufficient memory to load the program

□ b) CPU is busy running another program

□ c) named executable file is corrupted

□ d) hard disk failure

□ e) named executable file cannot be found

3.( ) What is the decimal equivalent of this unsigned 8-bit integer 10111101?

□ a) 111 □ b) 131 □ c) 151 □ d) 171 □ e) 189

4.( ) What is the decimal equivalent of this 8-bit signed integer 10111110 in 2's complement encoding?

□ a) 43 □ b) -21 □ c) -58 □ d) -66 □ e) 74

5.( ) Overflow cannot result from □ a) addition □ b) subtraction

□ c) multiplication □ d) division □ e) comparison

6.( ) Which of the following is volatile?

□ a) ROM □ b) RAM □ c) DVD □ d) hard disk □ e) magnetic tape

7.( ) Which of the following starts up the computer and functions as the principal coordinator of all hardware components and application software programs?

□ a) system hardware □ b) system server □ c) operating system

□ d) system operator □ e) command line interpreter

8.( ) Which of the following does not help in solving the von Neumann bottleneck?

□ a) increase of memory speed

□ b) increase of CPU speed

□ c) use of additional memory buses

□ d) increasing bus width

□ e) use of cache

9.( ) What is the benefit of translating a C program into assembly code before the object code is produced?

□ a) so that the code generator can be written as a separate assembler program

□ b) so that the compiled code runs faster

□ c) so that the compiled code has less semantic gap

□ d) so that the compiled code saves usage of memory

□ e) so that the compiled code has fewer bugs

10. ( ) Which of the following is not an advantage of 2's complement encoding?

□ a) more user friendly when compared to sign-magnitude encoding

□ b) easy to compute

□ c) efficient computation

□ d) subtraction is absorbed by addition

□ e) no duplicate exists when encoding 0

11.( ) Excess-49 notation for the 2-digit decimal representation of the exponent allows the encoding of the actual exponent in this range:

□ a) 0 .. 99 □ b) 1 .. 100 □ c) -50 .. 49 □ d) -49 .. 50 □ e) none of the above

12.( ) Registers are part of ?

□ a) memory □ b) cache □ c) secondary storage □ d) CPU □ e) power supply

13.( ) Executing more than one program concurrently by one (or more than one) user on one computer is known as

□ a) caching □ b) multitasking □ c) nesting □ d) multicasting □ e) interrupt processing

14.( ) Under the IEEE 754 standard, how many bits are required to specify the decimal point position?

□ a) 0 □ b) 1 □ c) 2 □ d) 3 □ e) 4

15.( ) Which of the following has the fastest access time?

□ a) ROM □ b) cache □ c) RAM □ d) DVD □ e) register

16.( ) Which of the following forms of data storage is the slowest to access?

□ a) direct access storage □ b) sequential storage □ c) random access storage

□ d) indexed sequential storage □ e) cache storage

17.( ) What type of flip-flop allows us to copy data?

□ a) SR flip-flop □ b) toggle flip-flop □ c) D flip-flop

□ d) J flip-flop □ e) ST flip-flop

18.( ) What are the main steps in a CPU cycle?

□ a) Compile, link, execute instructions

□ b) Interpret, translate to machine code, execute instructions

□ c) Instruction fetch, decode instruction, data fetch, execute and store

□ d) Data fetch, instruction fetch, decode instruction, execute and store

□ e) Instruction fetch, data fetch, decode instruction, execute and store

19.( ) Which of the following is not true?

□ a) A subroutine can be called from different places in the main program

□ b) A subroutine can call itself

□ c) Multiple stack frames can coexist in a program's stack during program execution

□ d) Upon subroutine call, ESP value must be saved

□ e) Parameters for function calls are stored using a stack

20.( ) How many bits are required for a Java short integer?

□ a) 1 □ b) 8 □ c) 16 □ d) 32 □ e) 64

21.( ) For a CDrom with a capacity of 700Mbytes to store video only (no audio) data, how many seconds of video can we store in it by maximum? Assume no compression is applied while video data has 160x120 pixels with 24bits/pixel for resolution and 30 frames/sec of frame rate.

□ a) 300 □ b) 350 □ c) 400 □ d) 425 □ e) 500

22.( ) Which of the following does not represent a typical use case of the Flag register in a Pentium processor?

□ a) overflow □ b) carry □ c) link □ d) sign □ e) interrupt

23.( ) Using 3 decimal digits only, what is the encoding of -177 in 10's complementary representation?

□ a) 118 □ b) 726 □ c) 365 □ d) 823 □ e) 989

24.( ) Which register is used to store the result of subtraction from this instruction, *CMP AL, BL*?

□ a) AL □ b) DI □ c) BL □ d) BX □ e) none of the above

25.( ) Which of the following comprises instructions to be executed by the computer?

□ a) hardware □ b) EBCDIC □ c) software □ d) Unicode □ e) ALU

26.( ) Assume Process A needs 10 pages of memory. When the CPU runs the process, it requests data from each of the 10 pages with equal probability. Assume that the average time to read a word of data from main memory is 5ns. Assume the average time to read/write a page from hard disk from/into main memory is 3000ns. Assume no caching and all pages in memory are dirty (i.e. have been altered).

Note that a page must be swapped out to make room for the incoming page.

What is the average access time to read a word of data if 3 pages of process A is stored in main memory at one time (the content of the other 7 pages are on hard disk) ?

□ a) 5 □ b) 3005 □ c) 2105 □ d) 3000 □ e) 4205

27.( ) What is the encoding of the number -123.625 in IEEE 754 single-precision format?

□ a) 11000010111101110100000000000000

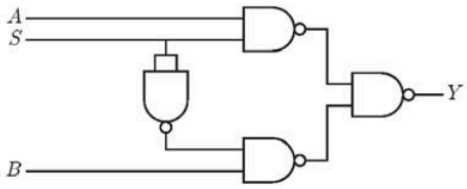
□ b) 11001010111101010100100000001000

□ c) 11010110111101110100000000000010

□ d) 11000110111101110100001100000000

□ e) 11000110111101110100010000000101

28.( ) Which of the following value for (A,B,S) gives Y as 0?



□ a) (1,0,1) □ b) (0,0,1) □ c) (0,1,0) □ d) (1,1,1) □ e) (1,1,0)

29.( ) Addition for *n*-digit numbers represented by 10's complementary convention is done based upon addition modulo ...

□ a) 2 □ b) n-1 □ c) 10^n □ d) 2^n □ e) n

30.( ) Given the following C library function 'printf' statement to be simulated via inline assembly code, how many parameters need to be pushed to the program stack before "call printf"?

printf("%d %d \n \n", i, j); //Here we assume i,j are declared as integers.

□ a) 0 □ b) 1 □ c) 2 □ d) 3 □ e) 4

Part II.

Answer all questions.

31. Drag-and-drop (for online test) or write the sequence number (for on-site test) of the assembly code to form a program where 10 numbers in an array are added and stored in the ebx register. Note that your sequence must absolutely match the line numbers to the left-most column of the table otherwise 3 marks will be deducted for each incorrect match. The answers for Lines 1, 2 and 5 have been provided. Complete the rest. (**15 marks**)

	Correct Sequence	**Pick From Here**	
Line 1	4	1	mov eax, array
Line 2	5	2	inc ecx
Line 3		3	myLoop: add ebx, [eax]
Line 4		4	mov ebx, 0
Line 5	6	5	mov ecx, 0
Line 6		6	add eax, 4
Line 7		7	jl myLoop
Line 8		8	cmp ecx, 10
		9	loop myLoop
		10	myLoop: add ebx, eax
		11	dec ecx

32. Fill in the missing places with the correct arguments/instructions for a program segment that pulls characters from a stack. (**10 marks**)

```
char newArray[MAX_SZ];
_asm{
        mov     ecx, ____
        mov     esi, 0

    myLoop:
        ____    eax
        mov     newArray[esi], ____
        ____    esi
        ____    myLoop
}
```

END OF THE PAPER