USN | | | | | | | | | | |

10CS46

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Computer Organization

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Mention the four types of operations to be performed by instructions in a computer. Also, explain the basic types of instruction formats using the example required to perform the action C ← [A] + [B]. **(08 Marks)**

b. The program can be run on a RISC or CISC computer. Both computers use pipelined instruction execution, but pipelining in the RISC machine is more effective than in the CISC machine. Specifically the effective value of basic steps required to execute one machine instruction for the RISC is 1.2, but it is only 1.5 for the CISC machine. Both machines have the same clock rate. What is the largest allowable value for N, the number of instructions executed on the CISC machine, expressed as a percentage of the N value for the RISC machine, if the time for execution on the CISC machine is to be no longer than that on the RISC machine? **(06 Marks)**

c. A program has 100 machine instructions in a straight line code and 100 machine instructions in a loop which gets executed for 49 times. The average number of basic steps needed to execute one machine instruction is 2 cycles and the processor is controlled by clock of 2 GHz. Find the time required for the program execution. **(04 Marks)**

d. Using 5 bit 2's compliment representation, perform the addition of signed decimal number (–10) + (–10). State whether overflow occurs or not. **(02 Marks)**

2 a. With a neat schematic diagram, explain the concept of stack frame and differentiate frame pointer from stack pointer. **(06 Marks)**

b. What is the need for Assembler Directives while writing Assembly Language program? Mention any three Assembler Directives and their purpose. **(06 Marks)**

c. For each instruction given below, indicate the addressing mode used for the source and destination operands. Also, find the effective address of memory operands. (Assume that the registers R1, R2 and R5 contain the decimal values 1200, 4600 and 5000 respectively)

i) Load 20(R1), R5 ii) Store R5, 30(R1, R2)

iii) Add –(R2), R5 iv) Sub (R1)+, R5 **(08 Marks)**

3 a. Write the summary of the sequence of events involved in handling an interrupt request from a single device. **(06 Marks)**

b. Mention the most important commonality and a difference between the interrupt and exception. Explain the two exceptions which a Debugger provides to the user as an aid in debugging programs. **(06 Marks)**

c. Explain how to facilitate the transfer of large block of data at high speed directly between an external device and the main memory. Write an appropriate block diagram to support the explanation. **(08 Marks)**

4 a. What are the key objectives for which the USB is designed? Explain the USB architecture with a neat block diagram. **(10 Marks)**

b. With a neat block diagram, explain the use of PCI bus in computer system and its important characteristics. **(10 Marks)**

PART – B

5 a. Explain the two ways of address distribution in multiple-module memory system. Mention one important advantage of each scheme. **(06 Marks)**

b. Draw the schematic diagram of memory circuit for 256 words of 8 bits each. Calculate the number of external connections for this memory chip. **(08 Marks)**

c. The main memory has 4K blocks of 16 words each and block-set-associative cache consisting of 128 blocks arranged as 64 sets. How many bits are there in each of the TAG, SET and WORD fields? **(06 Marks)**

6 a. Design a 4-bit Carry-Lookahead adder and represent the block diagram. Compare the delays of carry bits and sum bits to Carry-Lookahead adder and 4-bit ripple-carry adder. **(06 Marks)**

b. Find the product of signed numbers (–12) and (–9) using Booth's algorithm and verify the product obtained. **(08 Marks)**

c. Represent single-precision and double-precision IEEE standard floating point formats. Also, list the rules addition and subtraction of floating point numbers. **(06 Marks)**

7 a. Consider the instruction Add (R3), R1; List the actions required and control sequence steps for executing this instruction. **(08 Marks)**

b. Mention the control sequence required for executing Add R4, R5, R6 in three-bus organization of Data path. **(04 Marks)**

c. With a neat block diagram, explain the organization of microprogrammed control unit. **(08 Marks)**

8 a. With a neat block diagram, explain the shared memory multiprocessors. **(08 Marks)**

b. Suppose a single shared memory processor has 20 GB of main memory, five clustered computers each have 4 GB, and the OS occupies 1GB. How much more space is there for users with shared memory? **(04 Marks)**

c. Explain hardware multithreading and two main approaches to hardware multithreading. **(08 Marks)**

* * * * *