H Roll No. 2194026

TCS–404

B. TECH. (CSE)

(FOURTH SEMESTER)

MID SEMESTER

EXAMINATION, April, 2023

COMPUTER ORGANIZATION

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any ***one*** of the sub-questions.

(ii) Each sub-question carries 10 marks.

1. (a) Differentiate between Von Neumann Architecture and Harvard Architecture. What is meant by Von Neumann bottleneck ? How can it be resolved ?

(CO1)

P. T. O.

OR

(b) Consider if P is 16-bit signed integer. The 2's complement representation of P is $(F87B)_{16}$. Find the 2's complement representation of 8xP. (CO1)

2. (a) What is Non-Restoring Division Algorithm ? Draw its flowchart. Find 67 divided by 7 using Non-Restoring Division algorithm for unsigned numbers, where dividend will be of 7 bits. (CO1)

OR

(b) (i) Given the following binary number in 32 bit (single precision) IEEE-754 format :

1 10000111

11100000000000000000000.

Find the decimal value closest to this floating-point number.

(ii) Consider three registers R1, R2 and R3 that store number in IEEE-754 single precision floating point format.

Assume that R1 and R2 contain the values (in hexadecimal notation) 0×42200000 and 0×C1200000, respectively. If R3 = R1/R2, what is the value stored in R3 in IEEE-754 single precision floating point format. Show the detailed step of calculation. (CO1)

3. (a) Differentiate between byte addressable memory and word addressable memory.

Suppose you have a main memory which has 1024 locations and each location contains the contents of 2 bytes. A program is loaded from memory address 500 (in decimal). The format of instruction assumed in question is

Mode bit	Opcode	Address part

The instruction stored at memory address 500 is

1	MOV	R1,900

Content at memory address 250, 900, 1000 is 450, 1000, 25 respectively. What will be the contents inside PC, MAR, MDR, IR registers after the execution of the instruction at address 500. (CO2)

OR

(b) What is addressing mode ? Explain different types of addressing mode. Solve the following numerical : An instruction is stored at location 700 with its address field at location 701.The address field has the value 800. A processor register R1 contains the number 500. Evaluate the effective address if the address mode of the instruction is (a) direct (b) immediate (c) relative (d) register indirect (e) index with R1 as the index register. (CO2)

4. (a) Discuss the various factors affecting the performance of computer ?

Suppose that when Program A is run, the user CPU time is 3 seconds, the elapsed

wall-clock time is 4 seconds, and the system performance is 10 MFLOP/sec. Assume that there are no other processes taking any significant amount of time, and the computer is either doing calculations in the CPU, or doing I/O, but it can't do both at the same time. We now replace the processor with one that runs six times faster, but doesn't affect the I/O speed. What will the user CPU time, the wall-clock time, and the MFLOP/sec performance be now ? (CO2)

OR

(b) Write a sequence of instructions that will compute the value of $y = x^2 + 2x + 3$ for a given x using : (CO2)

(i) three-address instructions

(ii) two-address instructions

(iii) one-address instructions

(iv) zero-address instructions

5. (a) List different phases for an instruction cycle. Draw and explain the flowchart for an instruction cycle. (CO2)

OR

(b) What are bus in context to computer system ? Explain the working of 16 bit common bus system with diagram. (CO2)