



USN

10CS46

Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
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. List and explain the factors affecting the performance of a computer. (06 Marks)
b. Write a program that can evaluate the expression $A \times B + C \times D$ in a single-accumulator processor. Assume that the processor has Load, Store, Multiply and Add instructions and that all values fit in the accumulator. (06 Marks)
c. What do you understand by the following? Illustrate with an example:
(i) Big-Endian Assignment
(ii) Little-Endian Assignment (08 Marks)
- 2 a. What is the significance of addressing modes? Explain the following addressing modes with their syntax and an example: Indirect, Immediate, Index, Auto decrement, Base with index. (07 Marks)
b. State the need of assembler directives. Explain the following assembler directives with an example for each: ORIGIN, EQU, RESERVE, RETURN, DATAWORD. (07 Marks)
c. Write an assembly language routine that packs two BCD digits and stores the result to location PACKED. (06 Marks)
- 3 a. With necessary diagram, explain how simultaneous requests from multiple devices are handled. (08 Marks)
b. Define bus arbitration. Explain distributed arbitration scheme. Also, list its advantages. (08 Marks)
c. Distinguish between the following:
(i) Synchronous Bus and Asynchronous Bus
(ii) Cycle stealing and burst mode. (04 Marks)
- 4 a. List and explain Data transfer signals on PCI bus. (06 Marks)
b. Explain split bus operation in USB. (06 Marks)
c. Explain the following USB packet formats:
(i) Token packet
(ii) Data packet
(iii) SOF packet
Also, state the use of Isochronous traffic on USB. (08 Marks)

PART - B

- 5 a. With a neat diagram, explain organization of a $1K \times 1$ memory chip. (07 Marks)
b. Explain associative cache mapping function. (06 Marks)
c. With the help of diagram, explain virtual-memory address translation method. (07 Marks)
- 6 a. Design 16 bit carry – look ahead adder using 4 bit adders. Also, write equations for Generate, Propagate and Carry-out. (08 Marks)
b. Using Booth multiplication algorithm, multiply –13 and 11. (06 Marks)
c. Explain circuit arrangement for binary division using restoring division method. (06 Marks)

- 7 a. Draw three-bus organization of the processor unit. List control sequence for the instruction Add R4, R5, R6 for three-bus organization. (08 Marks)
- b. Draw block diagram of a complete processor with brief explanation. (04 Marks)
- c. Draw and explain basic organization of a micro-programmed control unit. Also, write micro-routine for the instruction branch < 0. (08 Marks)
- 8 a. With a neat diagram, explain classic organization of a shared memory multiprocessor. (06 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 1 GB. How much more space is there for users with shared memory? (06 Marks)
- c. Distinguish between SISD, SIMD, MIMD, SPMD and vector. (08 Marks)

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