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

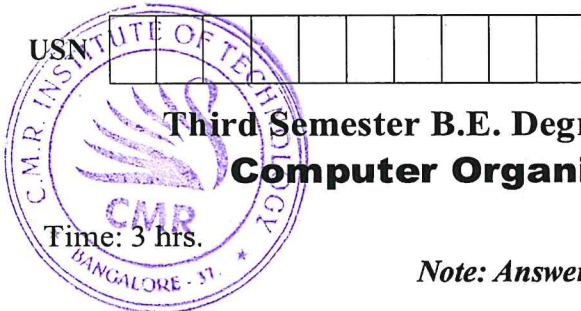**18EC35**

Third Semester B.E. Degree Examination, July/August 2021
Computer Organization and Architecture

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

1 a. Explain following registers: (i) PC (ii) IR (iii) MAR **(06 Marks)**
  b. Explain how user program and OS routine are sharing processor with printer. **(08 Marks)**
  c. Explain basic performance equation. **(06 Marks)**

2 a. Perform using 2's complement arithmetic: (i) $-5 + (-2)$ (ii) Subtract -5 from -7 **(06 Marks)**
  b. Explain BIG-ENDIAN and LITTLE-ENDIAN assignment. **(06 Marks)**
  c. Illustrate instruction execution and straight line sequencing for the program $C \leftarrow [A] + [B]$. [Assume that each instruction is 4 byte]. **(08 Marks)**

3 a. List the generic addressing modes with assembler syntax and addressing function. **(10 Marks)**
  b. Explain shift and any two rotate instructions with relevant diagrams. **(10 Marks)**

4 a. Write assembly language program to add 'N' numbers and store the result in 'SUM'. Assume the following address:
  (i) Program should start from '100'.
  (ii) 'N' is stored at 204
  (iii) Numbers are stored in memory from the address 208. Each number is 4 bytes.
  (iv) 'SUM' is stored at 200
  (v) Assume each instruction is 4 byte **(08 Marks)**
  b. Explain stack concept with relevant diagrams. **(08 Marks)**
  c. List the steps involved in 'CALL' and 'RETURN' instructions. **(04 Marks)**

5 a. Explain I/O interface for input device and also write the assembly program that reads the one LINE from the keyboard and echoes it back to the display. **(10 Marks)**
  b. Explain methods used for enabling and disabling interrupts. **(10 Marks)**

6 a. Explain daisy chain method used for handling simultaneous interrupt request. **(06 Marks)**
  b. Explain memory mapped I/O access. **(06 Marks)**
  c. Explain use of DMA controller in computer system. **(08 Marks)**

7 a. Calculate number of address lines required to access following memory:
  (i) 64 KB (ii) 512 MB (iii) 256 KB (iv) 8 GB **(04 Marks)**
  b. Explain internal organization of $2M \times 8$ dynamic memory chip. **(08 Marks)**
  c. Explain different types of nonvolatile memory. **(08 Marks)**

8 a. Explain cache memory and its relevant terms. **(08 Marks)**
  b. Explain virtual memory organization. **(06 Marks)**
  c. Explain magnetic disk principles. **(06 Marks)**

9 a. Explain single bus organization of the data path inside a processor. **(10 Marks)**
  b. List the steps involved in memory read operation and also draw corresponding timing diagram. **(10 Marks)**

10 a. Write the control sequence for execution of the instruction Add $(R_3), R_1$. **(06 Marks)**
  b. Explain block diagram of a complete processor. **(06 Marks)**
  c. Explain micro programmed control concept. **(08 Marks)**

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