2023

COMPUTER SCIENCE — HONOURS

Paper : CC-5

(Computer Organization and Architecture)

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer **question no. 1** and **any four** from the rest.

1. Answer **any five** questions :   2×5

   (a) What is cache memory?

   (b) What is index register? Explain with proper example.

   (c) Mention four important differences between micro-programmed and hardwired control.

   (d) Differentiate between memory mapped I/O and I/O mapped I/O.

   (e) What is the difference between a direct and indirect address instruction? Give examples.

   (f) What are the basic differences between a branch instruction and call subroutine instruction?

   (g) What is a tri-state device?

   (h) How many 128×8 RAM chips are needed to provide a memory capacity of 2048 bytes?

2. (a) Explain the operating principle of IAS computer with block diagram.

   (b) Explain DMA operation with suitable illustrations.   5+5

3. (a) Explain direct mapping in cache memory with appropriate example and illustration.

   (b) What is Virtual memory? Why is it necessary?

   (c) Write three main differences between Primary and Secondary memory.   5+2+3

4. (a) Explain the arithmetic unit of an ALU capable of subtracting 4-bit numbers using 2's complement method with suitable illustration.

   (b) What is Booth's algorithm for signed integer multiplication? Explain with appropriate example.

                                                     6+4

5. (a) What are the functions of Stack pointer and Program counter registers?

   (b) What is the role of MAR and MDR?

   (c) Specify three types of data transfer techniques.   5+3+2

(2)

6. (a) Connect a 2KB (2048×8) ROM and a 2KB (2048×8) RAM to a microprocessor that has a 16-bit address bus and 8-bit data bus in the memory range 0000_H to $07FF_H$ and 0800_H to $0FFF_H$. Draw the appropriate block diagram.

    (b) What constitutes a magnetic hard disk? Describe its fundamental structure. How is information recorded on the disk? Provide a concise explanation.   5+5

7. (a) Explain Programmed mode or Polling techniques used in I/O operations with suitable illustrations.

    (b) What are Interrupts? What is the difference between hardware and software interrupt?   5+5

8. Write short notes on *any two* of the following :   5×2

    (a) Memory Interleaving

    (b) Bus Arbitration

    (c) Stack based CPU organization

    (d) Register Transfer Language.

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