

1C8113

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Total No. of Pages: **4****1C8113****MCA I- Sem. (Main / Back) Exam., -2025****MCA-104 Computer Architecture****Time: 3 Hours****Maximum Marks: 70
Min Passing Marks: 28***Instructions to Candidates:**Attempt all Ten questions from Part A. All five questions from Part B and three questions out of five from Part C.**Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.**Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*1. NIL2. NIL**PART – A****[10×2=20]****(Word limit 25)**

- Q.1 Explain the significance of propagation delay in combinational circuits.
- Q.2 Describe the purpose of assembler directives in assembly language programming.
- Q.3 What is the difference between tightly coupled and loosely coupled multiprocessing systems?
- Q.4 Explain the role of the accumulator in the 8085 architecture.
- Q.5 Define vector processing and explain its applications.

- Q.6 Explain the function of a control bus in data transfer modes.
- Q.7 Define Register Transfer Language (RTL) and explain its significance.
- Q.8 Explain how a register is constructed using flip-flops.
- Q.9 Define the term "instruction cycle" and explain its phases briefly.
- Q.10 What is the purpose of flip-flops in digital circuits?

PART – B

[5×4=20]

(Word limit 100)

- Q.1 Simplify the Boolean expression $F(A, B, C, D) = \sum (0, 2, 6, 8, 10, 14)$ using K-map. Draw the minimized circuit diagram.
- Q.2 Explain the importance of timing in register transfer operations with the help of a diagram showing clock pulses and the corresponding register actions.
- Q.3 Explain the working of a DMA controller for transferring a block of data between memory and I/O devices.
- Q.4 Write an assembly language program to compute the factorial of a number using pseudo-instructions and macroinstructions.
- Q.5 Describe how data is transferred between two registers using a bus system.

PART – C

[3×10=30]

(Attempt any three questions)

- Q.1 Design a simple 4-bit Arithmetic Logic Unit (ALU) capable of performing addition, subtraction, AND, and OR operations. Explain its working with suitable diagrams.
- Q.2 Draw and explain the organization of a 4×4 associative memory system. Include the process of matching and retrieval.

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Q.3 Propose a distributed computing system architecture for a large-scale data processing application.

- (a) Explain how tasks are divided and executed in this system.
- (b) Discuss how failures and communication delays are handled.

Q.4 Illustrate the instruction cycle with a neat diagram showing fetch, decode, and execute phases.

Q.5 A vending machine accepts a coin and dispenses an item based on the following conditions -

- Item A is dispensed if the coin is C1.
 - Item B is dispensed if the coin is C2.
 - If both C1 and C2 are inserted simultaneously, no item is dispensed.
 - If no coin is inserted, the machine remains idle.
 - (a) Draw the truth table for the system.
 - (b) Derive the Boolean expressions for each output.
 - (c) Implement the circuit using logic gates.
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