

(3 Hours)

[Total Marks: 80]

NB: 1. Question No.1 Compulsory.

2. Solve any THREE from Q.2 to Q.6

3. Assume suitable data whenever necessary with justification.

- Q.1 Answer **any four** questions
- (a) Describe the memory hierarchy in the computer system [05]
  - (b) Give different instruction formats. [05]
  - (c) Explain principle of locality of reference in detail [05]
  - (d) Differentiate between Memory Mapped IO and IO Mapped IO. [05]
  - (e) Explain Superscalar Architecture. [05]
- Q.2 (a) A program having 10 instructions (without Branch and Call instructions) is executed on non-pipeline and pipeline processors. All instructions are of same length and having 4 pipeline stages and time required to each stage is 1nsec. [10]
- i. Calculate time required to execute the program on Non-pipeline and Pipeline processor.
  - ii. Calculate Speedup.
- (b) With a neat diagram , explain branch prediction in detail. [10]
- Q.3. (a) Explain page address translation with respect to virtual memory and further explain TLB in detail. [10]
- (b) What is "Microprogram"? Write microprogram for following operations. [10]
- i. ADD R1, M, Register R1 and Memory location M are added and result store at Register R1.
  - ii. MUL R1, R2 Register R1 and Register R2 are multiplied and result store at Register R1.
- Q.4 (a) Explain Bus Contention and different method to resolve it. [10]
- (b) Define instruction pipelining and its various hazards in detail. [10]

- Q.5. (a) Explain multi core processor architecture in detail [10]
- (b) Explain Booth's Multiplication algorithm and Perform  $(17)_{10} \times (-5)_{10}$ . [10]
- Q.6 Write short notes on any **two** [20]
- (a) Data transfer techniques
- (b) Set associative cache mapping
- (c) Flynn's Classification
- (d) Control unit of processor
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