

N.B. (1) Question No. 1 is compulsory.

(2) Attempt any four out of remaining six questions.

1. (a) Explain the virtual memory concept with reference to segmentation and paging. 10
(b) Explain Flynn's classification of parallel processing systems. 10
2. (a) Design the cache memory subsystem for the main memory of 4MB. Use two way associative cache organization. Draw the neat diagram and give the directory entry in detail. 10
(b) explain the steps in ALU design and explain ALU operation. 10
3. (a) What is microprogram control ? Compare Hard and Soft microprogramming. 10
(b) Draw the timing diagrams — 10
(i) Sequential Execution (ii) Two way pipelined Execution.

For the program,

```
LOAD   A ← M
LOAD   B ← M
ADD    C ← A + B
STORE  M ← C
BRANCH X
NOOP
```

Calculate no. of m/c cycles required in each execution and comment on result.

4. (a) Assuming that a magnetic disk has following characteristics — 10
(i) 10,000 rpm spin rate (iii) 3 ns T/T seek time
(ii) 2 ns head to head switching rate (iv) 5 platters, 1024 tracks per side, 50 sectors per track.
Compute : (1) average capacity of disk
(2) average random access time.
- (b) Explain Booth's Algorithm for multiplication of signed 2's complement numbers with example. 10
5. (a) Using 32×8 ROM chip with enable input, show the external connection to design 128×8 ROM. 10
(b) Explain any two techniques of bus arbitration. 10
6. (a) Explain I/O Processor with suitable block diagram. 10
(b) Explain DMA operation with suitable block diagram. 10
7. Write notes on (any two) : 20
(a) Interrupts (b) RAID (c) SISD and MIMD computers (d) CPU control unit.