

## Computer Architecture

1. Describe the structure of IAS computer.
2. What are the functions of the following registers:  
IR, PC, AC, DR, MQ, IBR, SP, MBR
3. Describe with suitable diagram about accumulator based CPU. What are the disadvantages of this structure? How can it be overcome?
4. What do you mean by instruction format?
5. What do you mean by m-address instruction & m-address machine?
6. What do you mean by addressing mode? Justify the existence of different addressing modes in a computer.
7. Write short notes on: Addressing modes.
8. Differentiate between:
  - Inherent ~~and~~ / Implied and Immediate.
  - Absolute / Direct and Indirect
  - Indirect and Register indirect
  - Direct and Paged
  - Direct and Register
  - Indexed and Based
  - Direct and relative
  - Direct and Immediate.
9. What are the criteria of an instruction set? What do you mean by Instruction set completeness?
10. What are the different types of instructions available in a computer?
11. Differentiate between: RISC and CISC.
12. Compare and contrast between 3-address, 2-address, 1-address and 0-address instruction with reference to the evaluation of the expression  $(A+B) * (C+D)$
13. What do you mean by fixed and floating point representation? What is normalized floating point number? What is biased exponent?
14. Write the advantages and disadvantages of machine-level, assembly-level and High level language?
15. State Von Neumann concept for stored program?
16. What are the major functions of CPU?
17. What do you mean by Instruction cycle, Fetch cycle & Execution cycle.
18. Draw a suitable diagram to illustrate Fetch & Execution cycle.
19. What is the function of Stack Pointer Register?
20. What is the usefulness of stack?
21. Implement a stack using shift register.
22. Write short note on: Characteristic of memory.
23. What is Destructive Readout (DRO) and Non Destructive Read Out (NDRO)?
24. Define: Cycle time, access time, bandwidth and data transfer rate.
25. How RAM is organized as Two-dimensional addressing mechanism.



26. Draw the structure of a 4x2 RAM.
27. Use 4x2 RAMs to design
  - 4x4 RAM • 8x4 RAM and • 8x2 RAM
28. Define: Seek time ( $t_s$ ), latency time ( $t_l$ )
29. Prove that in serial-Access memory (SAM),  $t_b = t_s + \frac{1}{2r} + \frac{n}{rN}$ , Where
  - $t_b$  = time to access a block,  $r$  = revolutions/sec.,  $N$  = capacity of a track
  - $t_s$  = seek time,  $n$  = Words need to be read.
30. What are the advantages of using cache memory?
31. What do you mean by locality of reference? How this concept is related to the development of cache?
32. What do you mean by hit and miss? What is hit ratio?
33. What do you mean by write back and write through cache. State their relative advantages and disadvantages.
34. Give the concept of Virtual Memory
35. If the cost per bit of a twolvel memory system  $M_1$  and  $M_2$  be  $C_1$  and  $C_2$  respectively and  $S_1$  and  $S_2$  denote the storage capacity in bits, then find the average cost per bit of memory system.
36. Why associative memory is also known as CAM?
37. Design a associative memory with  $m \times n$  size.
38. Describe different types of bus structure.
39. What do you mean by multiplexing of Bus? How is it differ from dedicated bus? What are the advantages and disadvantages of multiplexed Bus?
40. What do you mean by Bus arbitration?
41. Write short notes on: Daisy chaining, Polling & independent requesting with their relative advantages and disadvantages.
42. What do you mean by tri-state buffer? What is its application?
43. Write differences between programmed I/O and Interrupt initiated I/O.
44. Write a note on DMA. What is the difference between cycle stealing and block transfer DMA.
45. What do you mean by I/O mapped I/O and memory-mapped I/O? Write their advantages and disadvantages.
46. What do you mean by interrupt? What are H/W interrupt, S/W interrupt, maskable and non-maskable interrupt, vectored and non vectored interrupt.
47. Differentiate between:
  - i) RAM & ROM ii) Static & Dynamic RAM iii) Maskable and PROM
  - iv) PROM & EPROM v) EPROM & EAPROM
48. Write the roles of address bus, databus, and control bus in writing a piece of data onto a location of memory.
49. What is the meaning of CPI? Write the relation between averagetime  $T$  (in micro seconds), number of instructions  $N$ , clock frequency  $f$  (in MHz) and the CPI.



50. What do you mean by MIPS? A certain processor complete one instruction in 4 clockcycles, and the MIPS is 1.25. Find the clock frequency of the processor.
51. The memory map of a 4K byte memory chip begins at the address 2000H. Specify the last location of the chip.
52. Define (i) Instruction (ii) Operation.
53. What are the advantages of storing program and data in the same memory?
54. What are the major task of the control unit of any CPU?
55. Classify the computers depending on the number of addresses stored in the address fields of an instruction. Compare their performance in terms of saving in the amount of memory needed and the number of memory access required, considering the following two computation examples.
56. i)  $X = (A - B) / C + D$  (ii)  $X = A + B$  Where A, B, C, D and X refer to addresses in memory.
57. What are the different scheme of data transfer from CPU/memory to I/O devices and vice-versa? Discuss their merits and demerits. Discuss interrupt driven data transfer scheme.
58. "Integer computation is inherently carried out for any floating point operation" — justify.
59. Consider a 32-bit floating point number system with 8 bit exponent with 23 bit mantissa and a sign bit. Represent  $0.125 \times 10^9$  using (i) with 2's complement exponent (ii) with biased exponent.