

- 6%
1. In general, people prefer to use 2's complement integer representation, rather than 1's complement or sign-magnitude, in the design of CPU's Arithmetic Unit. Why?
- 8%
2. Describe the key concepts of the von Neumann architecture and the characteristics of Reduced Instruction Set Architectures.
- 6%
3. Define the following for a disk system
 s = seek time; average time to position head over track
 r = rotation speed of the disk, in revolutions per second
 n = number of bits per sector
 c = capacity of a track, in bits
 t = time to access a sector
 Develop a formula for t as a function of other parameters.
- 6%
4. In virtually all systems that including DMA modules, DMA access to main memory is given higher priority than CPU access to main memory. Why?
- 8%
5. Describe paging and segmentation memory systems and compare their properties.
- 6%
6. For an n -bit adder, what kind conditions will result in overflow? Assume the inputs of this adder are x_0, x_1, \dots, x_{n-1} , y_0, y_1, \dots, y_{n-1} respectively, and sum is s_0, s_1, \dots, s_{n-1} .
- 8%
7. List the advantages and disadvantages of the use of "microprogramming" and "hardwired" to implement a control unit.
- 8%
8. Explain why the following statement is not true:
 "The greater the number of stages in the pipeline, the faster the execution rate".
- 8%
9. Explain the Synchronous, and Asynchronous buses. What kind bus the Intel Multibus belongs?
- 8%
10. Write through and write back are two typical write policies used in cache memory systems. Explain and compare these two policies.
- 8%
11. Implement a full adder with just five gates.
- 10%
12. Draw a realization of a D flip-flop using only NAND gates.
- 10%
13. Using JK flip-flop to design a counter that has a repeated sequence of six states as listed in following table.

A	B	C
0	0	0
0	0	1
0	1	0
1	0	0
1	0	1
1	1	0