

1. (5%) Explain what are DRAM and SRAM?
2. (5%) What is the sequence of steps that CPU will perform for each instruction?
3. (5%) The clock rate of a RISC processor is 150,000,000 Hz. If each instruction takes 5 cycles to execute, how many MIPS has this processor?
4. (7%) A microprocessor is to be used to sense 11 different binary attributes of a process. How many I/O lines are needed to input all eleven binary values if
 - a) Parallel I/O is used?
 - b) Serial I/O is used?If serial I/O is used, how many of the total possible addresses are not used?
5. (8%) The largest constant that a certain microprocessor can hold in its memory is decimal 255.
 - (a) What is the number expressed in hexadecimal?
 - (b) What is the word length of this microprocessor?The largest memory address for this microprocessor is FFFF.
 - (c) How many bits, how many bytes, and how many nibbles of the memory capacity does this microprocessor have?
6. An industrial logic control system is being used to control a walking beam conveyor in a refrigerator manufacturing line. The operation has the following inputs:
 - 1) Power-on push button (momentary)
 - 2) Emergency stop push button (momentary)
 - 3) Sensor to detect "robots home"and a single output: conveyor in operation. The conveyor will start if the power is on, the robots are home, and the emergency stop push button is not depressed, and it will stay in operation, once started, unless the emergency stop push button is pressed.
 - (10%) (a) Generate the truth table that describes the operation of the system.
 - (10%) (b) Write the logic equation from the truth table, and then reduce this equation using Boolean algebra or Karnaugh maps.
7. (10%) The following program segment is designed to compute the product of two nonnegative integers X and Y by accumulating the sum of X copies of Y - that is, 3 times 4 is computed by accumulating the sum of three 4s. Is the program correct? Justify your answer.

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assign Product the value of Y;
assign Count the value 1;
while (Count < X) do
    (assign Product the value of Product + Y;
     assign Count the value of Count + 1)
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8. (6%) What is the result of assigning 26.1 to a variable of each of the following types:
 - a. integer
 - b. real
 - c. character

9. (10%) The concepts of sequential and indexed files are often combined by supplying an index to an otherwise sequential file, producing what is called an indexed sequential file. What advantages does such an organization have?
10. (7%) Draw a binary tree structure to store the list R, S, T, U, V, W, X, Y, and Z for future searching, and then
(7%) draw the actual organization of the binary tree using a linked structure.
11. (10%) What names are interrogated by the binary search when searching for the name Joe in the list Alice, Bob, Carol, David, Evelyn, Fred, George, Henry, Irene, Joe, Karl, Larry, Mary, Nancy, and Oliver?