

Reg. No.:

Name :



**Model Question Paper**

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| <b>Programme</b> | <b>: M.Tech</b>                                 | <b>Semester</b>   | <b>: I</b>        |
| <b>Course</b>    | <b>: Computer Architecture and Organization</b> | <b>Code</b>       | <b>: MCSE503L</b> |
| <b>Time</b>      | <b>: 3 Hours</b>                                | <b>Max. Marks</b> | <b>: 100</b>      |

Answer ALL Questions

| <b>Q. No.</b> | <b>Su b. Se c.</b> | <b>Question Description</b>  | <b>Marks</b> |
|---------------|--------------------|--|--------------|
| 1.            |                    | <p>A program is written in C language to do certain computation as follows.</p> <pre>main() {     int a, b, c, d, e;     int y;     y = (a - b)/(c+(d*e)); }</pre> <p>What is the equivalent compiler generated assembly codes for the processor which are developed based on Accumulator based organization and stack based organization.</p>   | 10           |
| 2.            |                    | <p>A computer has a small data cache capable of holding eight 32-bit words. When a program is executed, the processor reads the data from the following address sequence</p> <p>20, 24, 28, 20, 24, 28, 20, 24, 18, 21, 24, 20</p> <p>Show the content of the cache at the end of each pass if 2-way set associative cache is used with LRU replacement. Compute the hit rate. Assume that the cache is initially empty.</p> | 10           |

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| 3 | <p>A computer has L1 and L2 caches. The cache blocks consist of 8 words. Hit rate for both caches is equal to 0.95 for instructions and 0.9 for data. Time needed to access the data in these caches are <math>C1 = 1</math> cycle and <math>C2 = 10</math> cycles.</p> <p>It takes 1 clock cycle to send an address to main memory. The first word from memory can be accessed in 8 cycles, subsequent words of the block are accessed in 4 cycles per word. Also it takes one cycle to send one word to cache.</p> <p>What is the average access time experienced by the processes?</p> | 10       |
| 4 | <p>All four lift in the RMS mall is designed with an IR sensor to count the number of person loaded into the lift. For each new arrival of person into the lift, count gets incremented and count will be displayed. When the count exceeds “ten person”, then display “Overloaded. Please use another service”. Write an OpenMP program using C incorporating guided scheduling with last private construct.</p>   | 10       |
| 5 | <p>(i) In designing architecture for complex scientific application, state the various types of hazards explored in the system. With appropriate example, explain how to handle those hazards.</p> <p>(ii) Calculate the number of bits available in (2,2) branch predictor with 8K entries? How many entries are in a (0,2) predictor with the same number of bits?</p>  | 15<br>5  |
| 6 | <p>The total credit required to complete two years PG programme is 120 credit. Using OpenMP, automate the system to identify the credit completion status. Create maximum of 6 threads and schedule the process using dynamic scheduling. Use thread ID less than 2 to calculate the total number of credit completed by the student at the end of third semester. Use thread ID greater than 2 to calculate the number of credit yet to register to complete the course consider if any back log exist.</p>  | 10       |
| 7 | <p>(i) Create a CUDA program that uses multithreading to parallelize vector addition. Consider employing a thread block with 256 threads to parallelize vector addition using CUDA. Discuss all the steps in detail required during this process.</p> <p>(ii) For this CUDA program to parallelize vector addition, use any profile tool to perform appropriate profiling performance. Elaborate its results and outcomes in detail.</p>  | 10<br>10 |
| 8 | <p>In recent years, the total energy demand from buildings has risen dramatically. Improved access in developing countries, increased ownership of energy-consuming devices, and rising urban densities are driving this trend. Design an energy efficient architecture and illustrate the design process.</p>  | 10       |

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