Computer Architecture (EE-3009)
Assignment_01
Spring 2025

Due Date: Monday, February 24,2025 **Total Points: 50**

Instruction:

- You need to submit the **neat and clean handwritten scan copy** of the assignment **on classroom** before due date
- In case of plagiarism, **zero marks** will be awarded to the students.

Qus_01:

Consider two processors P1 and P2, executing the same instruction set. Assume that, under ideal conditions, for the same input, a program running on P2 takes 25% less time but incurs 20% more CPI as compared to program running on P1. if the clock frequency of P1 is 1 GHz, determine the clock frequency of P2 in GHz.

Qus_02:

A large-scale server farm consists of 1,000 identical servers. Each server has an MTTF of 20,000 hours and an MTTR of 4 hours. You need to calculate the following

- Calculate the failure rate (FIT) per server.
- Determine the expected number of failures per year (assuming continuous operation).
- Compute the overall system availability.

Qus_03:

A supercomputer cluster at a research facility has 500 nodes. Each node has an MTTF of 10,000 hours and takes 2 hours to repair.

- Compute the MTBF.
- Determine the cluster failure rate (failures per hour).
- If the organization wants fewer than 10 failures per year, what should the new MTTF per node be?

Qus_04:

Assume a MIPS processor, there are five types of instructions: Load (5 cycles), Store (4 Cycles), Branch (3 cycles) and Jump 3 cycles).

If a program has 50% Load instructions, 30% Store instructions, 10% Branch instructions and 5% Jump Instructions, calculate the average CPI.

Qus_05: Logical Reasoning

a) What was Dennard scaling? Briefly explain the common reasons for the failure of it after a span of 30 years.
b) Why Multiprocessors are called a silver bullet. Reason?
c) What kind of instructions are there on the basis of the instruction execution cycle?