**Sub 1.**

1. Calculate the speedup of a processor if the speed of floating point instruction that happen 20% of the time is 2 times faster.

2. What is temporal locality and when is it useful?

3. Ex cu normalizare benchmark

4. Calculate the maximum capacity/size of a processor if the bus has: x address bits, y data bits, z control bits (nu mi aduc aminte valorile)

5. What factors influence the processor’s clock frequency and why are newer processors limited in this aspect?

6. a. Scheme for sequential Carry adder și Carry Look ahead b. Floating point addition and subtraction (algorithm + scheme) c. What is arithmetic with saturation?

7. Superscalar P6 architecture. a. Describe the architecture, show the differences between a simple pipeline, draw scheme b. Describe the 3 autonomous units c. Explain how the P6 architecture solves hazards

8. Cache memories a. What are cache memories and what is their role? b. Enabling conditions c. Explain direct mapping and set associative (with examples and schemes) d. How to solve writing issues problems, what are the advantages and disadvantages for each solution

**Sub 2.**

1. Speedup of a processor with 4 cores and 80% parallel execution

2. Tabel de normalization cu 3 programe si 2 procesoare de unde rezulta ca procesoru a ii de 2 ori mai incet ca B

3. Ceva dubios care nu am mai vazut in niciun subiect

4. Moor's law and explain if it's still true today

5. List 5 characteristics of a HPC

6. How is division performed

a),b),c),d)

7. Memories

a) types of memories(3 characteristics)

b) ceva despre memorii in general

C) DRAM(diagram of the read operation, etc.)

d) how to speedup DRAM

8. Interconnected systems

a) purpose of interconnected systems

b) synchronous parallel bus

c) asynchronous parallel bus

d) asynchronous serial bus(RS424 sau cv de genu)

**Sub 3.**

1. de aplicat adahmel

2. Hyper threading (inclusiv procentul ala cu cat se imbunatateste timpul de executie (30%) se cerea sa fie mentionat)

3. ceva chestie dubioasa de imi dadea frecventa 2gHZ CPI=5, capacitatea memoriei 4gb si mai zicea ceva de 64 biti si se cerea nr de IPS (instr per second)

4. de aplicat media aritmetica si ce reprezinta rezultatul obtinut.

5. imi cerea capacitatea memoriei si aveam cate linii de adresa, de date si de control am.

6. Impartirea intregi, tipuri si pasii pt aia cu with partial result restored + impartirea la floating point (+ schema aia din curs pt impartirea la intregi).

7. Microprocesoare (def + semnalele de la bus + ex de procesoare de-a lungul istoriei + arhitectura P06 ce aduce nou)

8. Ierarhia memoriei (la ce ajuta + principii care sustin asta (spatial locality, temporal locality, 90/10) + segmentation (gdt, ldt, ...) + pagination)

**Sub 4.**

1. Compute the speedup of a program if the computer has 4 processors and 80% of the program can be executed in parallel.

2. Moore's law and arguments if it is still valid today

3. Compute the weighted (normalized) average mean of the following benchmark with processor B as a reference and draw the conclusions from the computations.

Program 1 20s 10s

Program 2 30s 15s

Program 3 60s 30s

4. List 5 features that characterize the high performance computers

5. Define arithmetics with saturation and give examples (up and down).

6. Division

- methods of division for integers and floating point

- describe the algorithm of division with partial results

- scheme for division algorithm

- principle of floating point division

7. Memory

- general characteristics of a memory

- ways of classification (at least 3 criteria)

- DRAM - principles, specifications, special requirements

- diagram for a read operation in DRAM

- methods of speedup for a DRAM (new technologies)

8. Interconnection Systems

- why and where are they used?

- describe a general purpose parallel asynchronous bus - principle, signals, advantages, drawbacks

- describe a general purpose parallel synchronous bus - principle, signals, advantages, drawbacks

- describe a serial bus