T-106.4155 Operating systems

The exam contains five questions. The maximum points for each question are listed in the beginning of the questions. Read the questions carefully. Give clear and compact answers. Remember to write the name of the course and your own personal information on each of your answer papers.

1 (10p) Give short and clear definitions for the following. Do not use long explanations or examples. (One point per question.)

a) What is an OS architecture?
b) What is an asynchronous call?
c) What is a critical section?
d) What is a scheduler?
e) What is a deadlock?
f) What is MMU?
g) What is external fragmentation?
h) What is a socket?
i) What is a disk partition?
j) What is starvation?

2 (6p) Consider a paging system which stores its *two-level* page table in memory and its 16 most recently referenced entries in a TLB. If for both reads and writes a memory access takes 80ns, a TLB lookup 10ns and disk access 5ms, how long does it take for a program to access its data? Assume both TLB miss and page fault rates to be 5%, and assume 20% of pages replaced have been modified.

3 (6p) Consider the dining philosophers problem (assume four philosophers). Write a *monitor* that implements mutual exclusion by offering suitable operations for their dining.

4 (4p) Explain how interrupt handling is done. What kind of data structures and phases are involved?

5 (6p) Considering device drives, write an essay that is not longer than a page.