

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 definitions for the following. (One point per question.)
 - a) What is MMU?
 - b) What is a preemptive scheduler?
 - c) What is response time?
 - d) What is a time sharing system?
 - e) What is a critical section?
 - f) What is an interrupt?
 - g) What is a virtual machine?
 - h) What is SMP?
 - i) What is an asynchronous call?
 - j) What is an elevator algorithm?

Note that long explanations (several sentences) are *not allowed*.

- 2 (6p) Considering the dining philosophers problem (assume five philosophers), give a solution that implements mutual exclusion by using *semaphores*. Present your solution as a piece of pseudo code and give a short explanation.
- 3 (4p) What conditions must hold in a system for a deadlock to be possible to occur?
- 4 (4p) How is the address translation from virtual addresses to physical addresses done in a modern operating system? What kind of hardware is available to support such translations in modern systems?
- 5 (6p) Write an one-page essay on differences, similarities and implementation techniques of threads and processes in Operating System kernel.