T-106.4150 Operating systems and concurrent programming

The exam contains six 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 the papers that you return.

1 (10p) Answer *shortly.* (One point per question.)

a) What is PSW in a processor?
b) What is an interrupt vector?
c) What is POSIX?
d) What is rendezvous?
e) What is spooling?
f) What is TLB?
g) What is priority inversion?
h) What is internal fragmentation?
i) What is NUMA?
j) What is double buffering?

2 (6p) Explain in detail the operation of a gang scheduler and the principles that gang scheduling is based on. What kind of tasks are suitable for such scheduling? What kind of tasks are not suitable?

3 (6p) Considering the producer-consumer problem, give a solution that implements mutual exclusion by using a *monitor.* Present the code for both the producers and the consumers.

4 (4p) List the phases of a remote procedure call.

5 (4p) What conditions must hold in a system in order for a *race condition* to occur (i.e., define in detail what the concept means)?

6 (6p) Write an essay that is not longer than a page discussing the structure and operation of device drivers.