Instructions: There are six questions which count 100 points in total. Each question may have several sub-questions. Please read the questions carefully before answering the questions.

1. What is the major advantage of the interrupt vector approach, compared with the generic handler approach, in interrupt handling? (8pts)

2. Please answer the following questions for process management and synchronization: (26pts)
   a. Please summarize the procedure in context switching between processes (instead of threads). What is “dispatch latency”? (10pts)
   b. Please define “signal delivery”. How the function abort() is implemented? (8pts)
   c. For a multiprocessor system, does atomic hardware instructions, such as Swap, make process-synchronization programming easier? You must provide explanation to receive any score. (8pts)

3. Please answer the following questions for process scheduling: (16pts)
   a. Is “Round Robin Scheduling” preemptive scheduling? You must provide explanation to receive any score. (6pts)
   b. Support that context switching cost is zero. Does “Round Robin Scheduling” with time quantum equal to an infinitely small value provide the worst average waiting time for process scheduling? You must provide explanation to receive any score. (10pts)

4. When the multi-core processors are used in a system and the physical memory are shared among all the cores, the operating system has to assure that the data are consistent all the time. One general approach is to organize all the memory in memory pages and lock the memory page when used. Please answer the following questions. (20 pts)
   a. Please define false sharing for shared memory. (4pts)
   b. When is the false sharing likely to occur? Please provide at least two examples. (6pts)
   c. Please discuss the advantages and disadvantages of using large block size and small block size in the design of block-based DSM system. (6pts)
   d. Please describe the difference between pipelined Random-access memory (PRAM) consistency and processor consistency. (4pts)
5. In distributed/multi-core operating systems, it is very often that the system has to adjust the workload on the computing units/cores so as to shorten the average response time. Please answer the following questions: (15 pts)
   a. Please differentiate between preemptive and non-preemptive process migration. (7 pts)
   b. From the point of view of supporting preemptive process migration facility, is a stateless or stateful file server preferable? Please give reasons for your answer. (8 pts)

6. Many distributed file systems use transactions for file services. Give suitable examples to illustrate how transactions help in doing the following: (15 pts)
   a. Improving the recoverability of files in the event of failures. (7 pts)
   b. Allowing the concurrent sharing of mutable files by multiple clients in a consistent manner. (8 pts)