

**178 330 Operating Systems**  
Final Examination  
28 February 2006 14.00 – 17.00

**Instructions:**

1. Books are NOT ALLOWED.
  2. A single sheet of A4 note is ALLOWED.
  3. There are 10 questions, 100 marks total, attempts ALL questions.
  4. Do NOT cheat.
- 

- 1 Determine and explain the three address binding techniques. What are differences among them ? (10 marks)
- 2 What is the dynamic storage allocation problem ? What approaches do we use to solve the problem ? What are differences among them ? (10 marks)
- 3 What are relationships between pages and frames in the paging system ? (5 marks)
- 4 How can the translation look-aside buffer (TLB) improve the paging performance ? (5 marks)
- 5 The TLB lookup is 100 times faster than the memory access. Given the hit ratio of 0.8, determine how much can the TLB improve the paging performance ? (10 marks)
- 6 Most implementations of the paging system are multi-level paging, why ? (10 marks)
- 7 Given a system with 4 frames, and the following sequence of page accesses:

2, 3, 2, 5, 1, 4, 2, 7, 3, 1, 6, 7

determine the number of page faults among FIFO, Optimal, and LRU page replacement algorithms (15 marks)

- 8 Determine advantages and disadvantages of contiguous allocation, linked allocation, and indexed allocation. (10 marks)
- 9 A hard disk has the geometry of 16 heads, 63 sectors, and 1,024 cylinders. Given the following sequence of cylinders to be accessed:

359, 966, 105, 115, 81, 255, 74, 236, 809

and the current head position of the cylinder 205, determine the number of cylinders that the disk head must be moved for the SSTF, SCAN, C-SCAN, and C-LOOK. (15 marks)

- 10 True or False (10 marks)
  - 10.1 FreeBSD is faster, safer, and more stable than Linux.
  - 10.2 Unununium is written in C.
  - 10.3 L4 is a microkernel-based OS.
  - 10.4 Exokernel is a microkernel-based OS.
  - 10.5 MacOS X/Darwin is based on Mach.
  - 10.6 QNX is POSIX-compliant.
  - 10.7 BSD is a UNIX.
  - 10.8 Linux is a UNIX.
  - 10.9 VxWorks is a hard real-time OS.
  - 10.10 Freeware is an abbreviation of Free Software.