Department of Computer Science and Engineering National Sun Yat-sen University Second Semester of 2023 PhD Qualifying Exam

Subject : <u>Operating Systems</u>

1. [Process: 20%]

- (1) Explain three conditions a solution to the critical-section problem must meet. (6%)
- (2) What are the four principal events which cause processes to be created? (4%)
- (3) Explain five metrics used to evaluate a process scheduling algorithm. (10%)

2. [Memory Management: 20%]

- (1) Explain how dynamic linking (for library routines) works? (10%)
- (2) What is Belady's anomaly in page replacement? Why can stack algorithms never exhibit Belady's anomaly? (6%)
- (3) When will the dirty bit and the reference bit of a page be set? (4%)

3. [File System and I/O: 20%]

- (1) Explain how incremental, physical, and logical dump work. (9%)
- (2) Explain memory-mapped I/O and programmed I/O. (6%)
- (3) Explain how to carry out a direct memory access (DMA) transfer? (5%)

4. [Distributed Systems: 20%]

- (1) Explain five reasons to perform process migration in a distributed system. (10%)
- (2) Explain both location transparency and location independence. (4%)
- (3) What are the three guidelines in the happened-before relation? (6%)

5. [Explanation of Glossary: 20%]

- (1) Address-space identifier
- (2) Conflict serializable
- (3) Trap door
- (4) Fault-tolerant system
- (5) Firm real-time system