

長庚大學 102 學年度第二學期 電機系博士班資工領域資格考試
科目：作業系統

1. For each of the operating system listed below, indicate its target application domains (for desktop computer, mobile devices, embedded systems, cloud servers, or industry applications, etc.) and briefly explain its features.
 - (a) Microsoft Windows **(5 pts)**
 - (b) Android **(5 pts)**
 - (c) Apple iOS **(5 pts)**
 - (d) Fedora Linux **(5 pts)**
 - (e) TinyOS **(5 pts)**
 - (f) uCOS **(5 pts)**

2. You are asked to explain why a computer needs an operating system. For each of the service provided by an OS listed below, indicate one drawback if there is no OS to provide such a service.
 - (a) Virtual memory **(5 pts)**
 - (b) File system **(5 pts)**
 - (c) System protection by separating kernel and user mode **(5 pts)**
 - (d) Time-sharing and multi-tasking support **(5 pts)**

3. Explain essential properties for each of the following types of operating systems:
 - (a) Interactive **(5 pts)**
 - (b) Time sharing **(5 pts)**
 - (c) Real time **(5 pts)**
 - (d) Clustered **(5 pts)**

4. Explain the difference between a process and a thread. Please also describe the advantage of multi-threading compared to multi-process programming. **(10 pts)**

5. Explain the concepts about memory fragmentation by answering the following questions:
 - (i) Give an example (with a sequence of memory allocation/de-allocation requests) to explain why there are fragmentations. **(5 pts)**
 - (ii) Give an example to explain what is external fragmentation. **(5 pts)**
 - (iii) Give an example to explain what is internal fragmentation. **(5 pts)**
 - (iv) Explain why a demand paging system does not have external fragmentation. **(5 pts)**