

國立高雄科技大學 114 學年度碩士班招生考試 試題紙

系 所 別： 資訊工程系碩士班

組 別： 不分組

考科代碼： 2022

考 科： 作業系統

注意事項：

- 1、「可使用電子計算器之科目」及「電子計算器攜帶、使用規定」，依本校公告規定辦理，違者依本校「試場規則及違規處理辦法」規定扣分。
- 2、請於答案卷上規定之範圍作答，違者該題不予計分。

1. You are given 5 processes with their arrival times and CPU burst lengths as shown in the table. Assume a time quantum of 2 milliseconds. For each algorithm, find the **average waiting time** and **average turnaround time**.
 - a. First-Come-First-Serve (FCFS) (6%)
 - b. Non-preemptive Shortest-Job-First (SJF) (6%)
 - c. Round-Robin (RR) (6%)
 - d. Which one(s) of the algorithms (FCFS, SJF, RR) may result in starvation? Please explain. (7%)

Process	Arrival Time	CPU Burst
P1	0	8
P2	1	4
P3	2	2
P4	3	6
P5	5	3

2. Assume there are 5 processes, P1 to P5, and 3 source types, A, B, C. The total available resources in the system are: Available = [2, 1, 2]. The Allocation and Maximum matrices for each process are given in the following table. Using the Banker's Algorithm, determine if the system is currently in a safe state. If it is safe, identify the safe sequence. If it is unsafe, explain why and discuss any potential request(s) that might cause the system to remain in an unsafe state. (10%)

Process	Allocation (A, B, C)	Maximum (A, B, C)
P1	(0, 1, 0)	(2, 3, 1)
P2	(2, 0, 1)	(4, 1, 2)
P3	(1, 0, 1)	(2, 2, 2)
P4	(0, 1, 1)	(1, 2, 2)
P5	(1, 1, 0)	(3, 3, 1)

3. You have 3 processes, P1 to P3, sharing 8 physical frames numbered from 0 to 7.
- a. Construct an inverted page table from the following page table. (10%)

Process	Virtual Page (VPN)	Physical Frame (PFN)
P1	0, 1, 2	5, 2, 7
P2	0, 1	0, 3
P3	0, 1	6, 1

- b. Assume the page size is 4 KB (4096 bytes). If Process P2 wants to read from virtual address 0x00001BCD (in hexadecimal), compute the physical address. (5%)
4. Assume demand paging with 3 frames, how many **page fault** would occur if the page reference string is 1, 2, 3, 1, 2, 4, 3, 4, 3, 2, 1, 4, 0, 2, 1, using the following page replacement algorithm?
- a. Optimal (10%)
- b. Second-chance (10%)
5. Assume that a RAID is composed of 10 hard drives, each with a capacity of 4TB. Without considering other overheads, please answer the **total capacity** and the **number of hard drives** that can fail while still allowing data recovery, in the following arrangements.
- a. RAID 6 (10%)
- b. RAID 1+0 (10%)
6. Explain the following terms.
- a. Belady's Anomaly (5%)
- b. Critical-section problem (5%)