Roll : 20

May 16, 2022

EAST WEST UNIVERSITY
Department of Computer Science and Engineering
B.Sc. in Computer Science and Engineering Program
Final Examination, Spring 2022

Course: CSE325 – Operating Systems, Section 1
Instructor: Md. Nawab Yousuf Ali, PhD, Professor, CSE Department
Full Marks: 20
Exam Time: 1 Hour 20 Minutes

Note: There are FIVE questions, answer ALL of them. Course Outcome (CO), Cognitive Levels and Mark of each question are mentioned at the right margin.

1. Consider the following resource allocation graph (RAG) depicted in Figure 1. [CO2, C3, Mark: 3+2]

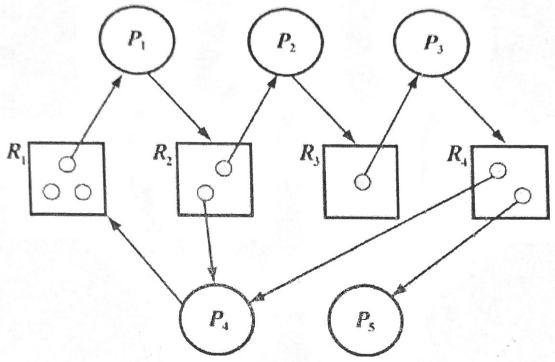

Figure 1. Resource Allocation Graph

a) Convert the graph to the matrix representation (i.e., Allocation, Request, and Available)
b) Is the system deadlocked? Why or why not?

2. Consider the following table (table 1) of resource requirements for five processes (P0-P4), four resource types (A, B, C, and D). The system contains a total of 8 instances of A, 5 instances of B, 7 instances of C, and 9 instances of D. Determine whether the current system is in a safe state or not using Banker's algorithm. If safe state, show the execution sequence of the processes. [CO3, C4, Mark: 5]

Table 1. Resource Allocation State

	Allocation				Max			
Process	A	B	C	D	A	B	C	D
P0	1	0	1	1	6	3	4	7
P1	1	2	1	1	7	4	4	7
P2	2	1	1	2	6	3	3	6
P3	1	0	1	2	4	2	3	4
P4	2	1	2	2	2	2	2	2

3. Consider a swapping system in which memory consists of the following free sizes in memory order: 7KB, 12KB, 4KB, 9KB, 16KB, 32KB, 18KB, and 20KB. Which free space is taken for successive segment requests of [CO3, C4, Mark: 3]
   a) 19KB
   b) 8KB

   for first fit, and best fit algorithm?

4. A logical address is represented by 16 bits, physical address represented by 12 bits, and page size of 16 bytes. [CO3, C4 Mark: 3]
   a) What are the number of pages and the number of frames?
   b) How many offset bits are there in the logical and the physical address?
   c) What are the number of entries in page table?

5. A page replacement algorithm is used with three frames (initially empty) for the following page references: 6 1 5 4 3 4 5 1 6 3 0 5 4 5 2 3. [CO3, C4, Mark: 4
   Determine the number of page fault that will occur in
   a) Least Recently Used (LRU) algorithm and
   b) Optima page replacement algorithm

*** *Good Luck* ***

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