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|  | **COLLEGE OF COMPUTING AND INFORMATION SCIENCES** | | |
| **Final-Term Assessment Spring 2021 Semester** | | |
| **Class Id** | 106342, 106239,40,41,42, 43 | **Course Title** | Operating Systems |
| **Program** | BSCS | **Campus / Shift** | Main Campus / Morning |
| **Date** | 29th April 2021 | **Total Points** | 50 |
| **Duration** | 03 hours | **Faculty Name** | Muhammad Naveed, Nadeem Qamar, Samrina Zameer, Umme Kulsoom |
| **Student Id** |  | **Student Name** |  |

**Instructions:**

* Filling out **Student-ID, Student-Name, Class ID** on exam header is mandatory.
* Do not remove or change any part of exam header or question paper.
* Write down your answers in given space or at the end of exam paper with proper title “Answer for Question# \_ \_”.
* In answers, only **photos of handwritten sheets, with page no. and name on the top**, will be accepted.
* Only PDF format is accepted (Student are advise to install necessary software)
* In case of CHEATING, COPIED material or any unfair means would result in negative marking or ZERO.
* A mandatory recorded viva session will be conducted to ascertain the quality of answer scripts where deemed necessary.
* **Caution:** Duration to perform Final-Term Assessment is **03 hours only** including submission time. **Therefore, if you failed to upload answer sheet on LMS (in PDF format) within 03 hours limit, you would be considered as ABSENT/FAILED.**
* Attempt **All** questions. All questions carry equal marks.
* Answer all the questions in this question paper.
* Check carefully PDF document before uploading that it has all the answers provided by you with snapshots if you have in your paper.

# Q1. Given four memory partitions of 600K, \_\_\_K, 250K, 500K (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of 128 K, 581 K, 411 K, and 221 K (in order)? Which algorithm makes the most efficient use of memory?

**Note:** The second value of memory partition indicated as \_\_\_ line should be the last three digit of student Id. For example if student Id is 9254 then 254 would be taken.

**Q2.** Consider the following page reference string

0 9 0 1 8 1 8 7 8 7 1 2 8 2 7 8 2 3 8 3

How many page faults and page hits will occur by using the following page replacement algorithms? Show proper working step by step

1. Optimal
2. LRU

**Note:** Total number of Page Frames should be the last digit of student Id. For example if student Id is 9254 then 4 Page Frames would be taken. If the last digit of student Id is 0, then any other digit greater than 0 could be taken as Page Frames.

**OR**

Analyze the following algorithm to solve the critical section problem and explain whether it satisfies the Mutual Exclusion Characteristic

Flag[i] = True;

Turn = j;

do{

while(Flag[j] = True && turn==j);

critical section

Flag[i] = False;

remainder section

} While(1)

**Q3. Answer the following**

1. Suppose a machine has 4 core processors. We want to utilize these 4 processors for maximum throughput by running a process having 4 threads using Many-to-one model. Can we achieve this objective? Justify your answer with proper reasoning.
2. We have a process having several threads. We observe too much frequent context switching among the threads and the threading management model applied is one-to-one. Is this an optimal multi-threading modeling for the given scenario? Justify your answer with proper reasoning.
3. We want to convert a single-threaded process into the multi-threaded process. What major observations would be there to consider? Justify by giving examples

**Q4.** Consider a simple paging system with the given parameters; page size 211 bytes; 223 pages can be accommodated in logical address space, while Physical memory address space should be given according to the **Note** below. Answer the following:

1. How many bits are in logical address?
2. How many bytes in a frame?
3. How many bits in the physical address specify the frame? How many entries in the page table?

**Note:**

The Physical memory address space should be defined in such a way that the last digit of student ID will place as the last digit of the value in 23?. Let suppose if student Id is 9012, then the Physical memory address space will be 232

**Q5.** Apply the following scheduling algorithms to the given scenario

1. Priority Scheduling Algorithm
2. Round Robin (Quantum = 5)

Note:

For Priority Scheduling Algorithm, lower number indicates higher priority, like priority of P1 is greater than P2 and priority of P2 is greater than P3 and so on.

The Burst Time should be modified in such a way that the last digit of Student Id should be the last digit of Burst Time. Let suppose if student Id is 2434, then the Burst time of P1 would be 22, P2 would be 42 and so on.

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| Process | Arrival Time | Burst Time |
| P1 | 5 | 2\_ |
| P2 | 2 | 4\_ |
| P3 | 1 | 2\_ |
| P4 | 1 | 1\_ |
| P5 | 4 | 3\_ |