# Department of Computer Science & Engineering

## University of Asia Pacific (UAP)

**Program: B.Sc. in Computer Science and Engineering**

**Final Examination** **Fall 2020** **4th Year 1st Semester**

**Course Code: CSE 405** **Course Title: Operating Systems** **Credits: 3**

**Full Marks: 120* (Written)** **Duration: 2 Hours**

* Total Marks of Final Examination: 150 (Written: 120 + Viva: 30)

**Instructions:**

1. There are **Four (4)** Questions. Answer all of them. All questions are of equal value. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.

**1.** Suppose, there are 5 processes $P_0$ through $P_4$; 3 resource types: *P* (11 instances), *Q* (6 instances), and *R* (8 instances). 30

Snapshot at time $T_0$:

| | *Allocation* | *Max* |
|---|---|---|
| | *P Q R* | *P Q R* |
| $P_0$ | 1 2 1 | 8 6 4 |
| $P_1$ | 3 1 1 | 4 3 3 |
| $P_2$ | 4 1 3 | 9 1 3 |
| $P_3$ | 3 2 2 | 3 3 3 |
| $P_4$ | 1 1 3 | 5 4 4 |

Here, Available = the last three digits of your ID, BUT, mod each digit with 4. For example of the last 3 digit of your id is 198, then Available = 110, (1%4 = 1, 9%4 = 1, 8%4 = 0). Now, perform Bankers and determine if there is any Deadlock present in this scenario.

**2.** Take the reverse string of your student ID. Now append(join) it with your Student ID(The reverse string appear first). Now, suppose this represent the page requests for a system. Now, apply all the three page replacement algorithms on this scenario, where window size = 4, and analyze which algorithm is better and explain why. 30

**3.** **a)** 15

| Process | Burst time | Priority | Arrival Time |
|---|---|---|---|
| A | 5 | 8 | 0 |
| B | 2 | 5 | 2 |
| C | 8 | 5 | 3 |

| | | | |
|---|---|---|---|
| D | 7 | 2 | 1 |
| E | 15 | 1 | 2 |

Consider the given scenario. Now, apply pre-emptive priority scheduling, Round Robin (quantam = 3) and shortest job first for the given scenario and prepare the grant chart and calculate the average waiting time.

**b)** What are the fundamental differences between a simple function call and a System call? Explain both of their mechanism. 15

**4.** **a)** What are the different states of a process? Explain with diagram and an example. 15

**b)** Write short notes on: Pipes, Sockets. What is the difference between Shared memory and message passing models of IPC. 15

**OR**

**a)** What is a critical section problem? Explain the requirements for Solution for a Critical-Section Problem. Also explain race condition with example. 15

**b)** Write short notes on: Readers writers problem, Dining philosophers problem. 15