SEMESTER 2
2021-2022

CS240FZ
Operating Systems, Communications and Concurrency

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Time allowed: 2 hours

Answer at least **seven** questions
Your mark will be based on your best **seven** answers

All questions carry equal marks

Instructions

	Yes	No
Log Books Allowed		X
Formula Tables Allowed		X
Other Allowed (*enter details)*		X

General (*enter detail)*

QUESTION 1

State five main tasks that an operating system performs. (10 marks)

QUESTION 2

State five main Unix interprocess communication mechanisms and summarise the characteristics that can be used to distinguish each one from the others. (10 marks)

QUESTION 3

Three jobs (A, B, C) arrive in the order A,B,C at approximately the same time and: (10 marks)

i. TASK A has a CPU burst requirement of 18

ii. TASK B has a CPU burst requirement of 6

iii. TASK C has a CPU burst requirement 3

Use the metrics of waiting time, response time, and turnaround time to analyse the scheduling performance of the folllowing non-preemptive algorithms:

1. First Come First Served (FCFS)
2. (ii) Shortest Job First (SJF)

QUESTION 4

Give a C/psuedo code to demo the pipe communication from a parent to child process. (10 marks)

QUESTION 5

State the Dining Philosophers problem. Outline the solutions to the Dining Philosophers problem for five philosophers and five chopsticks which prevent deadlock. (10 marks)

QUESTION 6

The first readers/writers concurrency problem prioritises readers and requires that no reader be kept waiting unless a writer has already obtained permission to use the shared item. Define a psuedo code solution to this coordination problem using semaphores. (10 marks)

QUESTION 7

What are the necessary conditions for a deadlock among a group of processes and how could a deadlock be prevented? (10 marks)

QUESTION8

Describe the internal and external fragmentation with diagrams. Explain clearly the benefits of paged memory. (10 marks)

QUESTION 9

Describe the generic design requirements of a File System. List and explain some of the basic system calls typically provided for accessing and organizing files. (10 marks)