



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020**

COURSE NAME : OPERATING SYSTEMS
COURSE CODE : BEC 41302
PROGRAMME : BEJ
EXAMINATION DATE : DECEMBER 2019/ JANUARY 2020
DURATION : 2 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

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- Q1** (a) A process is basically a program in execution. The execution of a process must progress in a sequential state. Illustrates the diagram of a process changes state as it executes. (5 marks)
- (b) Draw THREE (3) multithreading models for the user and kernel threads. (6 marks)
- (c) Describe the concept of context switch in OS process management. (4 marks)

Q2 Consider the following set of processes in **Table Q2(a)**, with the estimated CPU burst given in milliseconds, and lower priority numbers corresponding to higher CPU priority (1 is the highest). The processes are assumed, to have arrived in the order of P1, P2, P3, P4, P5, all at time 0.

Table Q2(a)

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

- (a) Produce THREE (3) Gantt charts that illustrate the execution of these processes using the following scheduling algorithms:
 (i) Non-Preemptive (NP) Shortest Job First (SJF)
 (ii) Non-Preemptive Priority
 (iii) Round Robin (RR) with Quantum=1 (7 marks)
- (b) Calculate the waiting time for each process based on the scheduling algorithm in **Table Q2(b)**.

Table Q2(b)

Process	NP SJF	NP PRIORITY	RR (Q=1)
P1			
P2			
P3			
P4			
P5			

- (c) Analyse the results in **Q2(b)**. (3 marks)

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- Q3** (a) Describe the “Producer-Consumer Problem”. (5 marks)
- (b) Analyse the similarities and differences between “Producer-Consumer Problem” and “Readers-Writers Problem”. (4 marks)
- (c) Explain THREE (3) requirements to solve Critical Section Problem. (6 marks)

- Q4** (a) State THREE (3) conditions that must be fulfilled for a deadlock to occur. (3 marks)
- (b) Determine whether the following resource allocation graphs in **Figure Q4(a) – Q4(d)** is a deadlock condition or not:

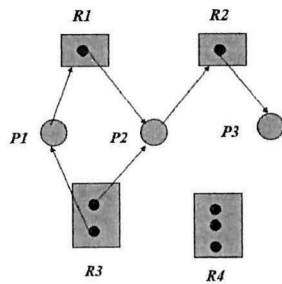


Figure Q4(a)

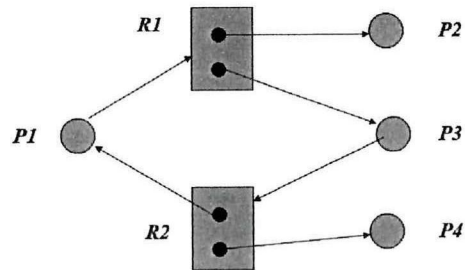


Figure Q4(b)

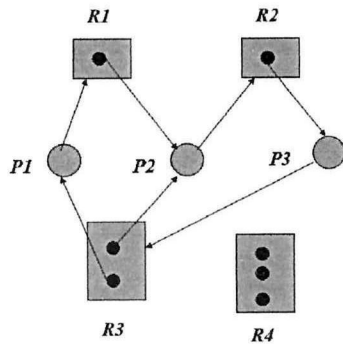


Figure Q4(c)

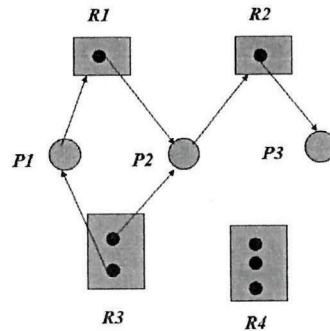


Figure Q4(d)

- (c) Explain TWO (2) strategies for handling deadlocks. (8 marks)
- (4 marks)

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Q5 (a) Discuss TWO (2) differences between logical and physical addresses. (4 marks)

(b) Produce TWO (2) examples of why it is important to consider the skill and resources available to likely intruders, when designing computer security mechanisms and policies to defend against those intruders. (4 marks)

(c) Consider the following page reference string:

0, 1, 4, 2, 0, 2, 6, 5, 1, 2, 3, 2, 1, 2, 6, 2, 1, 3, 6, 2,

How many page faults will occur if the program has THREE (3) page frames available to it and uses the following algorithm:

- (i) FIFO (First In First Out) replacement
 - (ii) LRU (Least Recently Used) replacement
- (7 marks)

Q6 (a) There are TWO (2) approaches to handle error for bad sectors. Briefly explain how to deal the bad sectors for each approach. (4 marks)

(b) While retrieving data from track 15 the following list of requests has arrived:-

Track Number: 4, 40, 11, 35, 7, 14.

It takes 1 ms to travel from one track to the next adjacent one. Calculate the total number of tracks and the average number of tracks by using these following device handlers seek strategies:

- (i) FCFS (First Come First Serve)
 - (ii) SSTF (Shortest Service Time Request)
 - (iii) SCAN
 - (iv) LOOK
- (12 marks)

(c) In a storage system with conventional magnetic-media disks, several different delays occur when servicing a request. Identify at least TWO (2) of these delays, and comment on their relative contribution to the total delay for servicing a request. (4 marks)

– END OF QUESTIONS –

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