Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2021/2022

COURSE NAME	:	OPERATING SYSTEM
COURSE CODE	:	BIT 20403
PROGRAMME CODE	:	BIT
EXAMINATION DATE	:	JANUARY / FEBRUARY 2022
DURATION	:	3 HOURS
INSTRUCTION	:	1. ANSWER **ALL** QUESTIONS
		2. THIS FINAL EXAMINATION IS CONDUCTED ONLINE AND CLOSE BOOK

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

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Q1 Answer **Q1(a)** and **Q1(b)** based on **Figure Q1**.

Figure Q1 shows illustration of single thread process and multiple thread process.

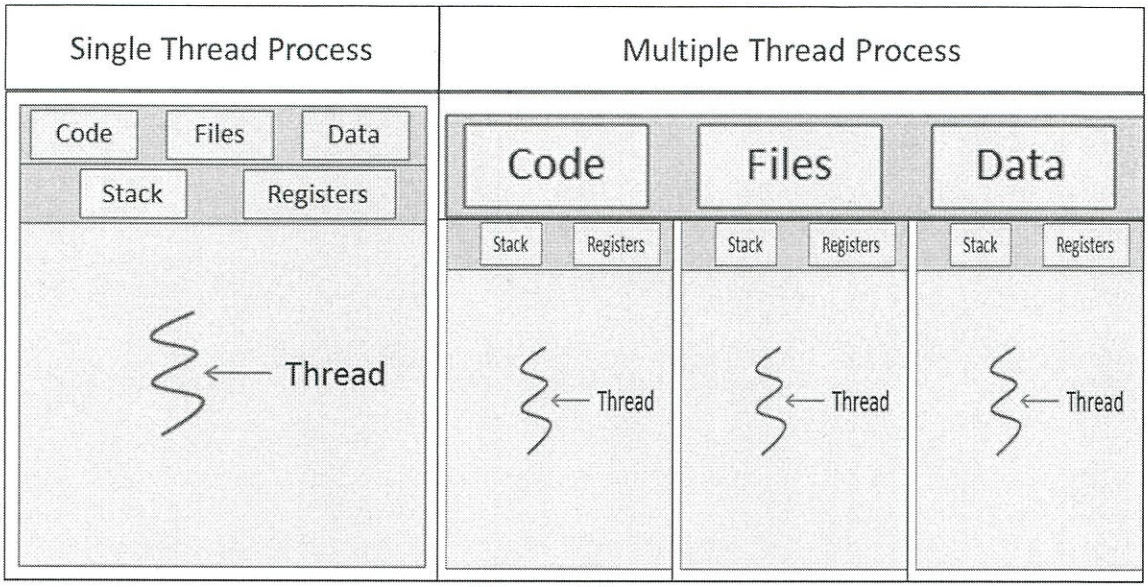

Figure Q1

(a) Analyse **THREE (3)** difference between processes and threads.

(6 marks)

(b) List **THREE (3)** examples of multiple threads happen while working on a Microsoft Word document.

(3 marks)

(c) If suddenly the process of the Microsoft Word requests a resource that currently held by another process, identify **TWO (2)** methods of recovery done by operating system.

(4 marks)

Q2 **Table Q2** shows list of processes (P1, P2, P3, P4, P5, P6 and P7) with their burst time. The time quantum is 8s (if required).

Table Q2

Process	Burst Time
P1	10
P2	6
P3	23
P4	9
P5	31
P6	3
P7	19

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Based on **Table Q2** above, answer the following questions.

(a) Calculate the average waiting time for each following algorithm: (Draw a Gantt Chart to support your answer)

(i) First Come First Serve

(4 marks)

(ii) Round Robin

(6 marks)

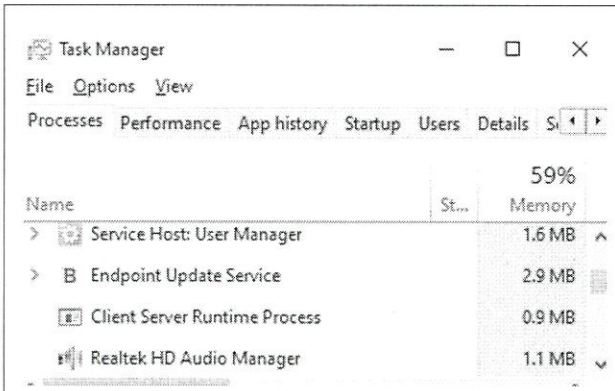
(b) Based on your answers in **Q2(a)**, which algorithm performs best? Justify your answer.

(3 marks)

(c) Identify **ONE (1)** algorithm that executes the shorter time process as priority and cannot be pre-empted until the job completes. Using a Gantt Chart, calculate the average waiting time for the algorithm.

(5 marks)

Q3 Given five memory partitions of 10 MB, 5 MB, 2 MB, 3 MB, and 6 MB (in order) and list of active processes as illustrated in **Figure Q3.**



Beginning Address (KB)	Memory Block Size (KB)	Status
35 300	10 000	Free
45 301	5 000	Free
50 302	2 000	Free
52 303	3 000	Free
55 304	6 000	Free
61 305	1 000	Busy
62 306	2 500	Busy

Figure Q3

(a) Identify which memory blocks are allocated to each of the processes using the following algorithm:

(i) Best-Fit

(4 marks)

(ii) Worst-Fit

(4 marks)

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(b) Based on your answers in **Q3(a)**, calculate the amount of internal fragmentations in each process memory block.

(i) Best-Fit

(4 marks)

(ii) Worst-Fit

(4 marks)

(c) Illustrate the deallocation of the Realtek HD Audio Manager process with its adjacent free block if the process terminates sooner than the rest based on your answers in **Q3(a)(ii)**.

(3 marks)

Q4 There are 9 workers for ASH Development Sdn. Bhd. as shown in **Table Q4**. Unfortunately, there are only 4 rooms available for these workers. Every week, a worker name is randomly selected to do odd jobs for the company. When a worker has been selected randomly, a room needs to be vacated if these rooms are full. Based on **Figure Q4**, worker's ID number 0 (Umar) is randomly selected for the first week, and the 4 boxes represent 4 rooms for workers.

Table Q4

Worker's ID	Worker's Name
0	Umar
1	Lukman
2	Arif
3	Yusuf
4	Anas
5	Muadz
6	Aleef
7	Hafiz
8	Amir
9	Taufik

WID	0	2	4	6	2	0	9	5	3	8	1	7	1	7	4	1	3	8	7
R1																			
R2																			
R3																			
R4																			
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19

Figure Q4

Investigate the number of page faults occur by illustrating the way how the room is managed using the list of weekly random selection of workers as shown in **Figure Q4** using the following algorithms:

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(a) Optimal Page Replacement (OPR) replacement algorithm

(5 marks)

(b) Least Recently Used (LRU) replacement algorithm

(5 marks)

Q5 (a) **Figure Q5(a)** shows a set of blocks of a secondary storage, each of which consists a block number.

0	1	2	3	4	5
6	7	8	9	10	11
12	13	14	15	16	17
18	19	20	21	22	23
24	25	26	27	28	29
30	31	32	33	34	35

Figure Q5(a)

Assume that the size of each block is 512 B. How many blocks should be allocated for a file with a size of 3072 B?

(2 marks)

(b) **Figure Q5(b)** shows a directory entry for four files named JJ, KK, CJ and LT in a disk.

File	Start	Length
JJ	0	2
KK	4	4
CJ	15	3
LT	30	5

Figure Q5(b)

(i) Based on files directory entry in **Figure Q5(b)** and using **Figure Q5(a)**, illustrates the files position using Contiguous Allocation method.

(8 marks)

(ii) Based on **Figure Q5(b)**, present the free space of the secondary storage using Bit Vector approach.

(4 marks)

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(c) **Figure Q5(c)** shows a single linked list data structure.

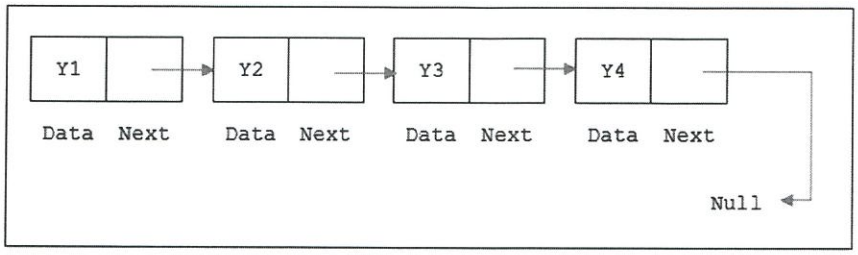

Figure Q5(c)

Based on the answer in **Q5(b)**, a new file needs four blocks to be stored in the secondary storage. Assign the values of Y1, Y2, Y3 and Y4 when using Linked Allocation technique.

(4 marks)

(d) Give an example of an excellent password and explain why it would be a good choice to protect a system from unauthorised user.

(2 marks)

-END OF QUESTIONS-

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