



UTHM

Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2017/2018**

COURSE NAME : OPERATING SYSTEMS
COURSE CODE : BIC 20803
PROGRAMME CODE : BIS / BIW / BIM / BIP
EXAMINATION DATE : DECEMBER 2017 / JANUARY 2018
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

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THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

SECTION A

State either **TRUE (T)** or **FALSE(F)** for each of the following statements.

- Q1** Program, data and stack are the three segments in a process of an operating system.
- Q2** Short-term scheduler selects which process should be executed from ready queue and is invoked very frequently.
- Q3** A good optimization criteria for Central Processing Unit (CPU) scheduling are to maximize CPU utilization and waiting time, and to minimize turnaround time, throughput, and response time.
- Q4** Round Robin scheduling algorithm associates each process with the length of the next CPU burst process.
- Q5** Prevention, avoidance and detection are the three basic approaches of deadlock handling.
- Q6** An algorithm that allocates the smallest hole that is big enough by searching the entire list (unless ordered by size) is refers to the worst-fit partition selection.
- Q7** Page replacement algorithm evaluates algorithm by running it on a particular string of memory references and computing the number of page faults on that string.
- Q8** Virtual memory can be implemented through demand paging and demand segmentation.
- Q9** Two steps to create a file are space in the file system must be found for the file and an entry for the new file must be made in the directory.

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- Q10** Single-level files directory can leads to confusion of file names when the number of files increases or when the system has more than one user.
(10 marks)

SECTION B

- Q11** Consider the following scenario.

Most contemporary web browsers provide tabbed browsing, which allows a single instance of a web browser application to open several websites at the same time, with each site in a separate tab. To switch between the different sites, a user need only click on the appropriate tab. A problem with this approach is that if a web application in any tab crashes, the entire process—including all other tabs displaying additional websites—crashes as well.

Google's Chrome web browser was designed to address this issue by using multi-process architecture. Chrome identifies three different types of processes: browser, renderers, and plug-ins. The browser process is responsible for managing the user interface as well as disk and network I/O. A new browser process is created when Chrome is started. Only one browser process is created. Renderer processes contain logic for rendering web pages. Thus, they contain the logic for handling HTML, Javascript, images, and so forth. As a general rule, a new renderer process is created for each website opened in a new tab, and so several renderer processes may be active at the same time. Renderer process, is, however, allowing tabs to share process if they are related to each other and are showing the same site. A plug-in process is created for each type of plug-in (such as Flash or QuickTime) in use. Plug-in processes contain the code for the plug-in as well as additional code that enables the plug-in to communicate with associated renderer processes and the browser process.

The advantage of the multiprocess approach is that websites run in isolation from one another. If one website crashes, only its renderer process is affected; all other processes remain unharmed.

Based on the given scenario, answer the following questions:

- (a) Identify **ONE (1)** scenario for the following types of process:
- (i) Independent process.
 - (ii) Cooperating process.
- (4 marks)
- (b) Discuss the feature of responsiveness in Google Chrome's multi-process architecture than single process browsers.
(6 marks)



- (c) Explain the need of setting up the limit of renderer processes in the multi-process architecture. (5 marks)

Q12 Given the following set of processes in Table Q12, with the length of CPU burst in milliseconds (ms). The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5 , all at time 0 ms.

TABLE Q12

Process	Burst time (ms)
P_1	2
P_2	1
P_3	8
P_4	4
P_5	5

- (a) Draw Gantt charts that illustrate the execution of the processes using the following scheduling algorithms:
- Preemptive Shortest Job First. (5 marks)
 - Round Robin (time quantum = 2 ms).
- (b) Based on the answer for Q12(a)(i) and Q12(a)(ii), calculate:
- Total waiting time for Preemptive Shortest Job First algorithm. (1 mark)
 - Average waiting time for Preemptive Shortest Job First algorithm. (3 marks)
 - Total waiting time for Round Robin algorithm. (4 marks)
 - Average waiting time for Round Robin algorithm. (2 marks)

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Q13 (a) Based on Figure Q13(a), answer the following questions:

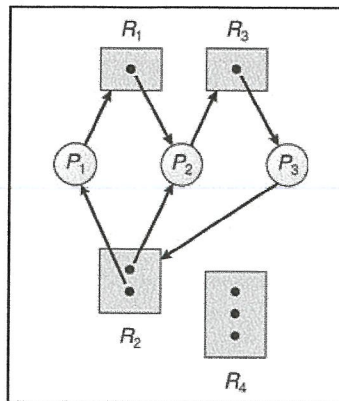


FIGURE Q13(a)

- (i) Identify set of Processes P , Resources R , and Edges E . (4 marks)
- (ii) Explain if a deadlock exist in the Figure Q13(a). (8 marks)

- (b) Assume a system consisting of four resources of the same type that are shared by three processes and each of process needs at most two resources. Explain the occurrence of the following scenario in the system:
 - (i) Deadlock.
 - (ii) Deadlock-free. (6 marks)

- Q14 (a) Explain the concept, similarity and difference between Logical and Physical address space. (6 marks)
- (b) Illustrate a physical memory with segmentation based on Base and Limit registers as shown in Table Q14(b). (5 marks)

Table Q14(b)

Segment	Base	Limit
0	250	275
1	550	333
2	1200	130

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- Q15 (a)** Determine the number of page faults from the following page replacement information. Show your works.
- (i) Reference strings: 1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2
Number of page frames: 4
Algorithm: First In First Out (FIFO)
(5 marks)
- (ii) Reference strings: 0, 2, 4, 6, 2, 0, 9, 5, 3, 8, 1, 7, 1, 7
Number of page frames: 3
Algorithm: Least Recently Used (LRU)
(5 marks)
- (b) Discuss Belady's anomaly in **Q15(a)(ii)** if the number of page frames is increased to four.
(5 marks)
- Q16 (a)** Discuss **THREE (3)** functions of file attributes.
(6 marks)
- (b) Illustrate the structure of file system layers in logical orders.
(4 marks)
- (c) Distinguish **THREE (3)** allocation methods of disk blocks.
(6 marks)

- END OF QUESTIONS -

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