



MALAYSIAN INSTITUTE OF INFORMATION TECHNOLOGY

**FINAL EXAMINATION
JANUARY 2016 SEMESTER**

SUBJECT CODE : IDB 20203
SUBJECT TITLE : OPERATING SYSTEMS
LEVEL : BACHELOR
TIME / DURATION : 2.00 pm – 4.30 pm
(2 ½ HOURS)
DATE : 22 MAY 2016

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
 2. This question paper is printed on both sides of the paper.
 3. This question paper consists of ONLY ONE (1) SECTION, SECTION A.
 4. Answer FOUR (4) of the FIVE (5) questions.
 5. Please write your answers on the answer booklet.
 6. Answer all questions in English.
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THERE ARE 4 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 100 marks)**INSTRUCTION: Answer FOUR (4) of the FIVE (5) questions.****Please use the answer booklet provided.****Question 1**

- a. There are many functions provided by the operating system services that are helpful to the users. Discuss **FOUR (4)** of the main functions. (4 marks)
- b. Memory Management determines what is in memory when optimizing CPU utilization and computer response to users. Elaborate other activities done by Memory Management. (6 marks)
- c. Describe what happens during a *swapping* process. Give **ONE (1)** example of swapping process in a Round-Robin CPU-scheduling algorithm environment when a quantum expires. (9 marks)
- d. Process scheduler selects among available processes for next execution on CPU and also maintains scheduling queues of processes. Explain all the different types of *scheduling queues*. (6 marks)

[Total: 25 Marks]**Question 2**

- a. The operating system is responsible for a number of activities in connection with process management. Discuss **FOUR (4)** of these activities. (4 marks)
- b. As a process executes, it changes states. Explain these states with the help of a diagram. (10 marks)
- c. Differentiate between *I/O-bound process* and *CPU-bound process*? Give at least **ONE (1)** example for each. (5 marks)

- d. An interrupt or a system call may cause the CPU to switch from one process to another process which calls for a context-switch. What happens during a context-switch and why is it an overhead?

(6 marks)

[Total: 25 Marks]**Question 3**

- a. Explain the concept of *convey effect*. Which scheduling algorithm suffers from this effect? (5 marks)
- b. Consider the following set of processes given in **Table 1**, with the length of the CPU-burst time given in milliseconds: (Note: The processes are assumed to have arrived in the order P1, P2, P3, P4, P5)

Table 1 Process Scheduling

Process	Burst Time	Priority
P1	10	2
P2	1	0
P3	2	2
P4	1	3
P5	5	1

- i. Draw a gantt chart of these processes and calculate the average 'waiting time' using the *Priority* scheduling algorithm. (8 marks)
- ii. Draw a gantt chart of these processes and calculate the average 'waiting time' using the *Round Robin (RR)* scheduling algorithm with *quantum size = 1*. (8 marks)
- c. Explain how the problem of *starvation* occurs. How this problem can be solved? (4 marks)

[Total: 25 Marks]

Question 4

- a. Deadlock can arise if **FOUR (4)** conditions hold simultaneously. Discuss these conditions.

(8 marks)

- b. Consider the following scenario:

$P = \{P1, P2, P3, P4\}$

$R = \{R1, R2\}$

$E = \{P1 \rightarrow R1, R1 \rightarrow P2, R1 \rightarrow P3, P3 \rightarrow R2, R2 \rightarrow P1, R2 \rightarrow P4\}$

Furthermore, there are two instance of resource type R1, and two instances of resource type R2.

- i. Draw Resource Allocation Graph from the above given data.

(6 marks)

- ii. From the resource allocation graph you draw, state whether the system is in safe state or deadlock state. Give reasons for your answer.

(5 marks)

- c. There are five criteria of CPU-scheduling algorithms. Choose **THREE (3)** of the criteria, describe each of it and define its optimization criteria.

(6 marks)

[Total: 25 Marks]

Question 5

- a. Differentiate between *internal* fragmentation and *external* fragmentation.

(6 marks)

- b. There are three different types of directory structures in Operating Systems. Explain any **TWO (2)** of these directory structures with the help of diagrams.

(6 marks)

- c. File/directory permissions in Linux-based OS can be modified using '*symbolic*' or '*octal*' methods. Describe these methods in detail with examples.

(7 marks)

d. What is *Virtual Memory* and what benefit does it offer?

(6 marks)

[Total: 25 Marks]

END OF EXAMINATION PAPER

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