MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2017/2018

FIRST YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

CITY CAMPUS

CIT 110: PLATFORM TECHNOLOGIES I

Date: 15th June, 2018 Time: 5.00 - 8.00pm

INSTRUCTIONS:

- Answer Question ONE in Section A and any other TWO in Section B.
- Write your registration number on all sheets of the answer book used
- Use a NEW PAGE FOR EVERY QUESTION attempted and indicate the question number on the space provided on each page of the answer sheet
- Fasten together all loose answer sheets used
- Mobile phones and PDAs are NOTallowed in the exam room.

CIT 110 PLATFORM TECHNOLOGIES 1

SECTION A:

QUESTION ONE COMPULSORY 30 MARKS

a) What are the three main purposes of an operating system? (3 marks)
b) What is a critical region? How do they relate to controlling access to shared resources? (3 marks)
c) What are two requirements of any solution to the critical sections problem? (2 marks)
d) What are the four conditions required for deadlock to occur? (4 marks)
e) Describe the following scheduling algorithms (6 marks)
   i. Non Pre-Emptive, First Come, First Serve
   ii. Round Robin
   iii. Shortest Job First
f) Given the following processes and burst times

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

Calculate the average wait time when each of the above scheduling algorithms (in no.e) is used? Assume that a quantum of 8 is being used. (12 marks)

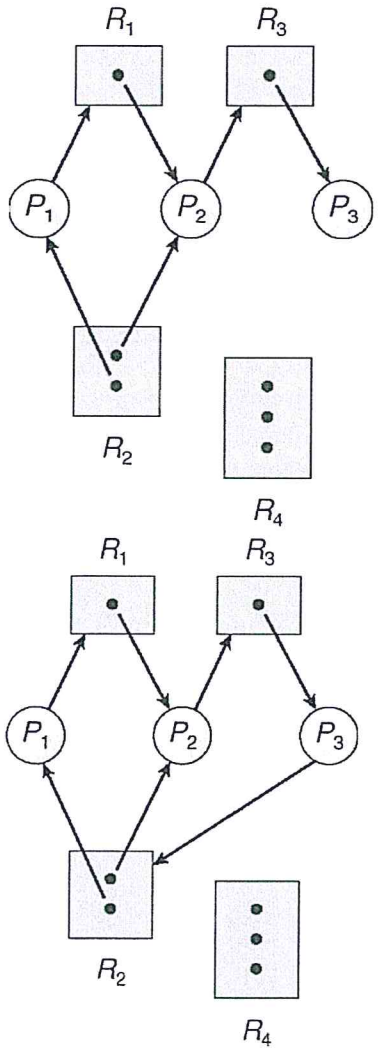
SECTION B

QUESTION TWO 20 MARKS

a) What are the four components of a process? (4 marks)
b) Provide at least three possible states a process may be in. (3 marks)
c) What is a Process Control Block (PCB)? (2 marks)
d) How many threads does a traditional, heavyweight process have? (2 marks)
e) Provide at least three benefits of multithreaded programming. (3 marks)
f) Describe an approach of mutual exclusion that does not require busy waiting. (6 marks)

QUESTION THREE 20 MARKS

a) explain the resource allocation graph below: (3 marks)



b) Is there any problem with resource allocation graph above? (2 marks)

a) Various scenarios can be described as deadlock. What are the minimum number of resources and the minimum number of processes needed to illustrate the classical definition of deadlock?

(4 marks)

b) Give any 3 of the 4 conditions the book lists as necessary in order for a system to be liable to deadlock. (3 marks)

c) For a resource allocation graph where there is only one instance of each resource type, is a cycle in the graph a necessary, a sufficient, or a necessary and sufficient condition for a deadlock? (4 marks)

d) For a resource allocation graph where there are more than one instance of each resource type, is a cycle in the graph a necessary, a sufficient, or a necessary and sufficient condition for a deadlock? (4 marks)

QUESTION FOUR

20 MARKS

1. Consider the following snapshot of a system:

	Allocation				Max				Available			
	A	*B*	*C*	*D*	*A*	*B*	*C*	*D*	*A*	*B*	*C*	*D*
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

Answer the following questions using the banker's algorithm:

a) What is the content of the matrix Needed? (6 marks)
b) Is the system in a safe state? (2 marks)
c) If a request from process P1 arrives for (0,4,2,0), can the request be granted immediately? (2 marks)

2. List five operating system services that are useful to users. (5 marks)
3. List five operating system functions that maintain efficient operation of the system. (5 marks)

QUESTION 5

20 MARKS

a) State the advantages and disadvantages of non-preemptive scheduling algorithm. (4 marks)

b) Consider the following page reference string:

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.

How many page faults would occur for the following replacement algorithms, assuming fourframes? Remember all frames are initially empty so your first unique pages will all cost one fault each.

i. LRU replacement (6 marks)
ii. FIFO replacement (5 marks)
iii. Optimal replacement (5 marks)

==========END==========