الجامعة السعودية الالكترونية
Saudi Electronic University

Midterm Examination Cover Sheet
First Semester: 1435-1436 / 2014-2015

Course Instructor:		**Exam Date:**	١٥-٠٣-٢٠١٥
Course Title:	Operating Systems	**Course Code:**	IT-٢٤١
Exam Duration:	**One Hour**	**Number of Pages:** (including cover page) **6**	

Exam Guidelines

- **Mobile phones are not permitted.**
- **Calculators are permitted.**

Marking Scheme

Questions	Score
1 – [10]	
2 – [5]	
3 – [2]	
4 – [3]	
5 – [5]	
Total – [25]	

Student Name: _____   **Student ID:** _____

Question 1: MULTIPLE CHOICE QUESTION
[10 MCQs of 10 Marks]

1. _____ allows the parent and child processes to initially share the same pages, but when either process modifies a page, a copy of the shared page is created.
   a) copy-on-write
   b) zero-fill-on-demand
   c) memory-mapped
   d) virtual memory fork

Answer: A

2. _____ occurs when a process spends more time paging than executing.
   a) Thrashing
   b) Memory-mapping
   c) Demand paging
   d) Swapping

Answer: A

3. Consider the memory shown in the following figure, where there are 6 free holes (named hole A,…., hole F), let new process of size 16k must be allocated, if the best-fit algorithm used, the process will allocate in:

   a) hole E
   b) hole D
   c) hole C
   d) hole F

Answer: B

4. Request edge is converted to an assignment edge when:
  a) The resource is allocated to the process.
  b) The resource is released by the process.
  c) All of the above
  d) Non of the above

Answer: A

5. _____ is the process of determining that a deadlock exists and identifying the processes and resources involved in the deadlock.
  a) Deadlock prevention
  b) Deadlock avoidance
  c) Deadlock recovery
  d) Deadlock detection

Answer: D

6. In the dining philosophers problem with 5 philosophers, the number of philosophers who may eat simultaneously is
  a)1
  b)3
  c)5
  d)2

Answer: D

7. The ____ scheduling algorithm is designed especially for time-sharing systems.
  a) SJF
  b) FCFS
  c) RR
  d) Multilevel queue

Answer: C

8. Which scheduling algorithm allocates the CPU first to the process that requests the CPU first?
  a) first-come, first-served scheduling
  b) shortest job scheduling
  c) priority scheduling
  d) none of the mentioned

Answer: A

9. CPU scheduling decisions take place when a process:
   a) Switches from running to waiting state
   b) Switches from running to ready state
   c) Switches from waiting to ready
   d) All of above

Answer: D

10. The _____ multithreading model multiplexes many user-level threads to a smaller or equal number of kernel threads
   a) many-to-one model
   b) one-to-one model
   c) many-to-many model
   d) many-to-some model

Answer: C

## Question 2: TRUE/FALSE QUESTION   [5 Marks]

Write True or False of each statement

| 1	In general, virtual memory decreases the degree of multiprogramming in a system	F
2	Mobile operating systems typically support swapping.	F
3	In a multiprogramming system, main memory is divided into multiple sections: one for the operating system (resident monitor, kernel) and one for the set of processes currently being executed.	T
4	The optimal algorithm is used to replace a page that will not be used for longest period of time	T
5	If a resource-allocation graph has a cycle, then the system is absolutely in a deadlocked state.	F

Question 3: [2 Marks]

Given the following resource-allocation graph, draw the corresponding wait-for graph
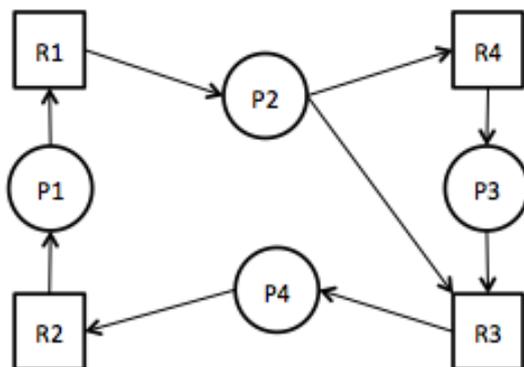
Answer:
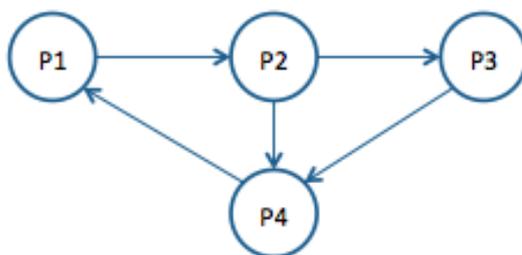
Question 3: [3 Marks]

Explain the sequence of events that happens when a page-fault occurs

Answer:
When the operating system cannot load the desired page into memory, a page-fault occurs. First, the memory reference is checked for validity. In the case of an invalid request, the program will be terminated. If the request was valid, a free frame is located. A disk operation is then scheduled to read the page into the frame just found, update the page table, restart the instruction that was interrupted because of the page fault, and use the page accordingly.

Question 4: [5 Marks]

Suppose we have the following page accesses: 1 2 3 4 2 3 4 1 2 1 1 3 1 4 and that there are three frames within our system. Show the steps using the FIFO page replacement algorithm. What is the number of page faults for the given reference string?

Answer:

1	2	3	4	2	3	4	1	2	1	1	3	1	4

1	1	1	4	4	4	4	4	4	4	4	3	3	3
	2	2	2	2	2	2	1	1	1	1	1	1	4
		3	3	3	3	3	3	2	2	2	2	2	2

Page faults = 8