الجامعة السعودية الالكترونية
Saudi Electronic University

Ministry of Higher Education
Saudi Electronic University
College of Computing and Informatics

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. When two or more processes need a resource that it will never get, this situation is called

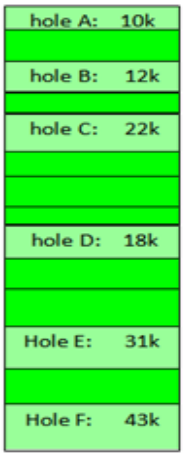
a) Bounded-Buffer
b) Deadlock
c) Bankers Algorithm
d) Semaphore

Answer: B

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 worst-fit algorithm used, the process will allocate in:



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

Answer: D

4. An edge that indicates a process P may ask for a resource R in the future:
   a) Claim edge
   b) Request edge
   c) Direct edge
   d) Assignment edge

Answer: A

5. If there is enough total memory space to satisfy a request for allocating new process, but they are not contiguous, this situation called:
   a) Internal fragmentation
   b) External fragmentation
   c) Contiguous allocation
   d) Dynamic loading

Answer: B

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. Assume the value of the base and limit registers are 1200 and 350 respectively. Which of the following addresses is legal?
   a. 355
   b. 1206
   c. 1551
   d. all of the above

Answer: B

9. The mapping of a logical address to a physical address is done in hardware by the _____.
   a) memory-management-unit (MMU)
   b) memory address register
   c) relocation register
   d) dynamic loading register

Answer: A

10. 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. Using the FIFO replacement algorithm, what is the number of page faults for the given reference string
   a) 14
   b) 8
   c) 13
   d) 10

Answer: B

Question 2: TRUE/FALSE QUESTION [5 Marks]

Write True or False of each statement

1	The difference between a program and a process is that a program is an active entity while a process is a passive entity.	F
2	In Global replacement, each process selects from its own set of allocated frames only.	F
3	Deadlock detection allows the system to enter a deadlock state and then recover	T
4	A multicore system allows two (or more) threads that are in compute cycles to execute at the same 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]**

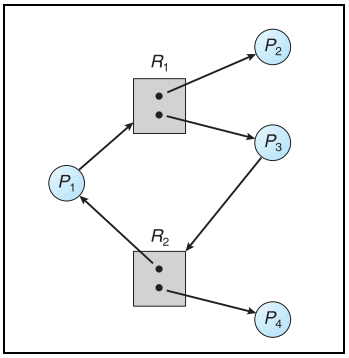
What are the differences between internal and external fragmentation?

Answer:

Fragmentation occurs when memory is allocated and returned to the system. As this occurs, free memory is broken up into small chunks, often too small to be useful. **External fragmentation** occurs when there is sufficient total free memory to satisfy a memory request, yet the memory is not contiguous, so it cannot be assigned.
Some contiguous allocation schemes may assign a process more memory than it actually requested. **Internal fragmentation** occurs when a process is assigned more memory than it has requested and the wasted memory fragment is internal to a process.

Question 3: **[3 Marks]**

Does the following resource-allocation graph have a deadlock? Why?



Answer:
There is no deadlock. Because if the resource-allocation graph does not have a cycle, then the system does not fall in a deadlocked state. Process P4 may release its instance of resource type R2. That resource can then be allocated to P3, breaking the cycle P1→ R1→ P3→ R2→ P1.

Question 4: **[5 Marks]**

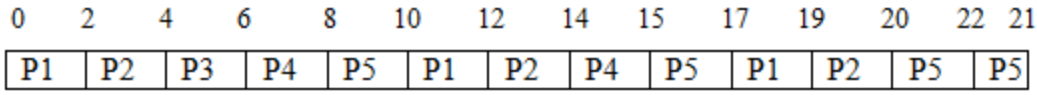
Consider the following set of processes, with the length of the CPU burst time given in milliseconds:

Process	Burst Time
P_1	6
P_2	5
P_3	2
P_4	3
P_5	7

The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5 all at time 0.

a. Draw the Gantt chart that illustrate the execution of these processes using the Round Robin scheduling algorithms with quantum time = 2.
b. What is the waiting time of each process for this scheduling algorithms?

Answer:



Process	Waiting Time
P_1	0 + (10-2) + (17-12) = 13
P_2	2+ (12-4) + (19-14) = 15
P_3	4
P_4	6 + (14-8) = 12
P_5	8+ (15-10) + (20-17) =16