COMPUTER SCIENCE DEPARTMENT AL aL-BAYT UNIVERSITY		TIME ALLOWED: 50 MINUTES MAXIMUM MARKS: 20 MARKS
SECOND EXAM, FALL EXAMINATION 2018		OPERATING SYSTEM 901332
(WRITE YOUR NAME AND YOUR ROLL NO. ON THE TOP IMMEDIATELY ON THE RECEIPT OF THIS QUESTION/ANSWER PAPER.)		
NAME_____		ROLL NO. _____

Question 1: (10 Marks)
Fill in the table below with the correct answer. Only answers in this table will be corrected.

Question No.	1	2	3	4	5	6	7	8	9	10
Answer										

1. Which of the following statements about semaphores is correct?
   A. A binary semaphore can be used in the same way as a simple lock.
   B. A semaphore is an integer count with some indivisible operations and an initialization.
   C. Returning a resource when no process is waiting causes the semaphore value to increase.
   D. All of the above.

2. Medium-term scheduling is performed _____ .
   A. typically on submitted jobs
   B. when processes must be moved from waiting to ready state
   C. on processes in the ready queue
   D. None of the above are correct.

3. A thread control block _____ .
   A. is managed by the parent process
   B. contains the same information as the process control block
   C. has the identical structure as the process control block
   D. does not include information about the parent process resource allocation

4. When a child process is created, which of the following is a possibility in terms of the execution or address space of the child process?
   A. The child process runs concurrently with the parent.
   B. The child process has a new program loaded into it.
   C. The child is a duplicate of the parent.
   D. All of the above

5. The Producer-Consumer problem is related to _____ .
   A. the handling of process control blocks
   B. the scheduling of process states
   C. the allocation of resources to process states
   D. Both A and C are correct answers.

6. Producer consumer problem can be solved using:
   A. Semaphores
   B. Atomic proesses
   C. Monitors
   D. All of the above

7. Threads that are part of the same process share the same stack.
   A. True
   B. False

8. With kernel-level threads, multiple threads from the same process can be scheduled on multiple CPUs simultaneously.
   A. True
   B. False

9. With producer/consumer relationships and a finite-sized circular shared buffer, producing threads must wait until there is an empty element of the buffer.
   A. True
   B. False

10. Deadlock can be avoided by using semaphores instead of locks for mutual exclusion.
   A. True
   B. False

Question 2: (3 **M**arks)
Shortly define the following:

1. **Race Condition**

2. **Deadlock**

3. **Starvation**

Question 3:

A. Compare user threads and kernel threads. (4 Marks)

B. Compare between Direct Communication and Indirect Communication among processes. (4 Marks)

Question 4: (6 **M**arks)

Processes go through the following states in their lifetime.

Consider the following events and answer the questions that follow. Assume there are 5 processes, all either in the read or running states initially. Assume the processes are using a single processor.

- At time 5: P1 executes a command to read from disk 3.
- At time 15: P3's time slice ends.
- At time 18: P4 executes a command to write to disk 3.
- At time 20: P2 executes a command to read from disk 2.
- At time 24: P3 executes a command to join with P5.
- At time 33: An interrupt occurs indicating that P2's read is complete.
- At time 36: An interrupt occurs indicating that P1's read is complete.
- At time 38: P5 terminates.
- At time 48: An interrupt occurs indicating that P4's write is complete.

For each time **22, 37 and 47,** identify which state each process is in. If it is waiting, indicate what it is waiting for.