Q1	Q2	Q3	Total
/30	/35	/35	/100

Computer Operating Systems Midterm Exam

Duration: 90 minutes   **No questions allowed.**   **19.04.2017**

Please note:
* There are questions on all FOUR pages.
* Put your answers in the spaces below the questions. You will NOT receive any points otherwise.
* You will NOT receive any points for answers which are not explained.
* Give all answers in English. You will NOT receive any points otherwise.
* You are not allowed to use any electronic equipment, books, notes, etc during the exam.

Q1. Please answer the questions below. Explain your answers.

a) Compare and contrast *Deadlock avoidance techniques* and *deadlock detection techniques* in terms of efficient resource usage, assumptions made to apply the technique and deadlock prevention success.

b) What are the different states processes can be in throughout their lifetimes? Explain each state and explain the transition conditions between these states.

c) Explain how semaphores are used to implement synchronization between two processes. Use an example in your explanation.

d) Is *busy waiting* <u>always</u> less efficient (in terms of using processor time) than a *blocking* wait? Explain your answer.

e) What are the advantages of using different quantum sizes on different levels in the multilevel queues scheduling method?

Q2. In a system there are 9 homogeneous resources. 4 processes (P1, P2, P3 and P4) share these resources. At the start of execution, all processes have declared their total (maximum) resource usage as follows: P1:6, P2:1, P3:4, P4:4. At a given time t, assume that process P1 has 3 resources, process P2 has 1 resources, process P3 has 2 resources and process P4 has 2 resources. <u>When the system is in this state</u>, determine whether the following resource requests will be granted using the Banker's algoritm. Explain your answer. (Consider each case seperately).

a) P2 requests 1 more resource.

b) P3 requests 1 more resource.

c) P1 requests 1 more resource.

Name:
No:
Signature:

Q3. Five batch jobs A, B, C, D and E arrive at a computer center at the same time (at time=0). The quantum size of this system is 2 units of time. The jobs have estimated running times of 10, 6, 2, 4 and 8 units of time respectively. For each of the scheduling methods given below, calculate the average waiting time for the 5 jobs. <u>Show (use timing diagrams) and explain your steps.</u>

<u>Note:</u> Whenever needed, assume processing order as A, B, C, D, E

<u>Hint:</u> For example, job A requires 10 units of time of CPU time and arrives at the system at time=0. If it leaves the system at time=30, the waiting time for this job is (30-0)-10=20 units of time.

a) Round robin scheduling

b) First-come first-served (FIFO) scheduling

c) Multilevel queues scheduling (same quantum on all levels, no priorities)