

**LEHMAN COLLEGE
OF THE
CITY UNIVERSITY OF NEW YORK**

**Department of Computer Science
CMP426-697: Operating Systems**

Midterm Examination, Fall 2018

Name:

1. Answer the following questions.

- (a) In Microkernel architecture, only basic IPC (inter process communication) mechanism, CPU scheduling, and memory management service are kept in the kernel address space. Other services such as File service, device driver service, etc. are kept in user address space.
- (i) How the kernel communicates with user level services? (2 points)
 - (ii) (ii) What are pros and cons of Microkernel Architecture compared to Monolithic Kernel architecture? (8 points)
 - (iii) Consider that you are designing Windows 9. Give two arguments in favor of a microkernel organization, and two arguments against it. (8 points)
- (b) What are the strengths and weaknesses of the message based communication and shared memory based communication in a single system environment in terms of security and efficiency? (8 points)
- (c) Aside from microkernel architecture, list at least two other different ways for structuring an operating system. (2 points)
2. Answer the following questions: Describe the two general roles of an operating system and elaborate why these roles are important. (10 points)
3. What is a process? What are attributes of a process? (10 points)
4. Describe the three state process model, describe what transitions are valid between the three states, and describe an event that might cause such a transition. (10 points)
5. What is the function of the ready queue? (4 points)
6. What is the producer consumer problem? Give an example of its occurrence in operating systems. (10 points)

7. What is the system call? And list least three of the major categories of system calls. (10 points)
8. Answer the following questions
 - a. (8 points) What are threads? Why might we use threads?
 - b. (6 points) List three of their (potential) benefits.
 - c. (6 points) List three challenges of writing multi-threaded application.
9. Compare and Contrast each pair of the following terms (10 points)
 - a. Shared memory and Message passing
 - b. Blocking send and Non-blocking send