CSE-C3200 Operating systems

The exam contains five questions. The maximum points for each question are listed in the beginning of the questions. Read the questions carefully. Give clear and compact answers. Remember to write the name of the course and your own personal information on each of your answer papers. No extra appliances are allowed in the exam.

1 (10p) Answer *shortly* with clear definitions and descriptions. (Max. two points per subquestion.)

a) What is the difference between a process and a thread?

b) What is middleware?

c) What is priority inversion?

d) What are livelocks and deadlocks?

e) What is symmetric multiprocessing?

2 (6p) Considering the *producers-consumer* problem, give a solution that implements mutual exclusion without starvation by using asynchronous messaging. Assume a single buffer and unlimited number of readers and writers. Use the messaging primitives `send(channel target, int value)` and `int receive(channel target)`. Present your solution as a piece of *pseudo code* and explain it clearly. List also the assumptions that you make about the semantics of the messaging primitives.

3 (4p) Typically `open` and `close` calls are used when handling files. Why such operations are needed? How they are related to `read` and `write` calls?

4 (6p) Describe the typical services, structure, and operation of a device driver in a modern operating system. Include the related hardware support and hardware-software co-operation in your description.

5 (6p) Write an essay that is not longer than 50 lines on memory management.