Part B

Question B1

1. Describe and illustrate with a diagram the life cycle of a thread from being created to termination. List the ways by which a thread can be blocked and unblocked. [10 marks]

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Blocked: 1.wait 2.sleep 3.others join 4 wait for resource like lock

Unblocked: 1.signal 2.join 3.notify

b) Write a program that creates two threads, one to print out “Hip, hip!”, and the other to print out “Hooray!” (both in finite counting loops). After creating the two threads, the main

program should terminate. [10 marks]

1. Modify your program so that the thread printing out “Hip, hip!” would run first, and the thread printing out “Hooray!” be allowed to run only after the “Hip, hip!” thread has finished. [5 marks]

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Question B2

1. What are the three key features of a monitor and how are they used to support concurrent programming? [6 marks]

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b) A bridge over a river is only wide enough to permit a single lane of traffic. A collision can occur if two cars moving in different directions enter at the same time. We can call the cars moving in one direction “red cars” and the cars moving in the opposite direction “blue cars”. Write a monitor SafeBridge (with redEnter, redExit, blueEnter, blueExit operations) to control access to the bridge, so that the cars moving in different directions cannot concurrently use the bridge. [12 marks]

c) Provide an implementation of RedCar class (or BlueCar class) describing the behaviour of red (or blue) car threads which access the safe bridge from part b). You may assume that a journey across the bridge takes 5 seconds. [7 marks]

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