Programming in Java

Describe briefly the facilities provided in Java for synchronising concurrent threads. [6 marks]

An alternative scheme would be to model the system used in some shops where a machine issues numbered tickets to customers, and customers are served in numeric order. A ticket machine holds an integer, initially zero, and has a single atomic operation:

```
turn()  # increments the integer and returns its previous value
```

A scheduler also holds an integer, initially zero, and has two atomic operations:

```
next()  # increments the integer count
queue(value)  # suspends the calling thread until the count is at least as large as the value given as an argument
```

Given a ticket machine, m, and a scheduler, s, a critical region could then be coded as follows:

```
number = m.turn();
s.queue(number);

protected code

s.next();
```

Write Java classes TicketMachine, with a turn method, and Scheduler, with next and queue methods. [8 marks]

Show how a synchronised buffer holding a single value could be implemented using this new scheme. [6 marks]