

School of Engineering and Applied Science

CSE332 - Operating Systems

End Semester Exam

Q-1

b. Multi-threading

In main() we have declared a variable called thread_id, which is of type pthread_t, which is an integer used to identify the thread in the system. After declaring 3 thread_id, we have called pthread_create() function to create three threads.

In between we have called mutex to synchronize all the threads. In an Operating System, we have a number of processes and these processes require a number of resources. In this situation 3 threads are using the same variable "i". They are reading the variable and then updating the value to the variable and finally writing the data in the memory.

You can see from the above that a process will have to read the value of I then increment the value of I by 1, and then write the value of I in the memory after doing various operations. There are three threads that need to be run right now.

Now, to synchronise all three threads, we used the mutex lock in the xyz function to ensure that no more than one thread is utilising the value of num at the same time, and then we printed the num's ascii value and integer value. The mutex was then unlocked, allowing other threads to make changes as well.

```
hurutika@hp-Ubuntu: ~/Desktop/EndSem
hurutika@hp-Ubuntu:~$ cd Desktop
hurutika@hp-Ubuntu:~/Desktop$ cd EndSem
hurutika@hp-Ubuntu:~/Desktop/EndSem$ gcc q1b.c -o q1b -lpthread
hurutika@hp-Ubuntu:~/Desktop/EndSem$ ./q1b
A      1      a      B      2      b      C      3      c      D      4
d      E      5      e      F      6      f      G      7      g      H
8      h      I      9      i      J      10     j      K      11     k
L      12     l      M      13     m      N      14     n      O      15
o      P      16     p      Q      17     q      R      18     r      S
19     s      T      20     t      U      21     u      V      22     v
W      23     w      X      24     x      Y      25     y      Z      26
hurutika@hp-Ubuntu:~/Desktop/EndSem$
```

Q-2

b.