National University of Computer and Emerging Sciences, Lahore Campus

Course:	Operating System	Course Code:	CL-316
Program:	BS(Computer Science Department)	Semester:	Fall 2016
Duration:	2.30hrs	Total Marks:	100
Paper Date:	December 23, 2016	Weight:	40%
Section:	A-B	Pages:	2
Exam:	FINAL	Roll No:	

Instructions/Notes: Honesty is the best policy.

1. Your Answers must be concise, to the point, well **indented, aligned** and properly written.
2. Total time of the paper includes submission time. **No extra time will be provided for submission.**
3. Submission MUST be on **XEON**.
4. Manage your time wisely after reading question paper carefully.
5. Submit only one Source file **RollNo.cpp** Do not submit .rar file.
6. Use of internet, cell phones, USB or any other helping material will award you **F-Grade** in Lab.

Good Luck

Question 1 (100 points): You have to model a packing line where some toy cars are being processed. The cars need to be sorted and packed before they are sent to the warehouse.
A sorting mechanism takes the cars from the line and loads them onto different lines for packaging depending on the scale/size i.e. **the sorting thread** reads the toy cars from the file and inserts them into different buffers depending upon the scale/size.
The packaging units, different for all three lines, packs them so they could be dispatched to the warehouse i.e. **the packer thread** would read the elements from a buffer and if sufficient elements are found, it removes them and increments the box count for the respective size.

Note:

1. The cars have three different scales(sizes): small, medium, and large.
2. The input file should be named toys.txt.
3. The input file will only include random occurrences of characters 's', 'm' and 'l', denoting small, medium and large toy cars respectively.
4. Each separate packing line must be modeled by a vector/circular buffer.
5. Lines in [4] must be read as FIFO.
6. The buffer for small cars can hold up to 15 elements, the medium one can hold 10 and the one for large can hold elements max at any given time.
7. The toy cars are packed in boxes. A box can contain, 6 small cars, 4 medium cars, OR 2 large cars.
8. There must be a thread that prints how many boxes each line produced. This thread prints the number of boxes ready for dispatch every second.
9. The sorting and packing units must be modeled as threads (1 sorter, 3 packers and 1 printer, 5 in total).