**National University of Computer and Emerging Sciences, Lahore Campus**

| | Course: | | Course | |
|---|---|---|---|---|
| | | **Advance Database Systems** | **Code:** | **CS451** |
| | **Program:** | **BS(Computer Science)** | **Semester:** | **Spring 2018** |
| | | | **Total** | |
| | **Out Date:** | **07-Feb-2018** | **Marks:** | **30** |
| | **Due Date:** | ~~**15-Feb-2018**~~ **Tue 20-Feb-2018** | **Weight:** | |
| | **Section** | **A & B** | **Page(s):** | **1** |
| | **Assignment:** | **1 (Concurrency Control Techniques)** | | |

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*Instructions:*

• Use proper assignment papers for solving your assignment questions. Assignment done on diary pages, register pages, rough pages will not be credited.

• Do not copy the work of your peers. In case cheating is detected, then your case will be referred to DC

**S1:**
$r_1l(x),r_1(x),w_2l(y),w_2(y),w_1l(y),w_2l(x),w_1(y),c_1,w_3l(z),w_3(z),w_2(x),w_2l(z),w_3l(x),w_2(z),c_2,w_3(x),c_3$.

(**Hint: You can acquire and release locks according to the need. Use the lock and unlock statements carefully in flow. $r_1l$=read lock by T1 $w_1l$=write lock by T1**)

**S2:**
$r_1(z),r_1(y),w_1(y),w_2(y),r_2(z),r_3(x),w_3(x),w_1(x)c_1,w_2(z),r_3(y),c_2,c_3$.

(**Hint: You can change the position of acquiring and releasing lock to create the scenario in order to run below techniques.**)

For above schedules apply below mentioned concurrency control techniques and show all working with proper flow.

1. **Two Phase locking**
   Basic (i) Wait-die (ii) Wound-wait, Strict, Rigorous, Conservative
2. **Timestamp Ordering**
   Basic, Strict, With Thomas Write Rule
3. **Multi version**
   To phase locking (i) Wait-die (ii) Wound-wait, Timestamp Ordering
4. **Optimistic concurrency control protocol**

**Note:** Assume any valid assumption where needed. E.g. for Time stamp ordering you can ignore locking order in above schedule and can assume that **T1(oldest)<T2<T3(youngest)**.