Databases

(a) Define the ACID properties of a transaction. [6 marks]

(b) Define what is meant by *strict two-phase locking* (strict 2PL). [4 marks]

(c) Assume that in addition to traditional *Read* and *Write* actions a DBMS supports increment and decrement actions: *Inc* and *Dec* (both are assumed to perform blind writes).

Consider the following two transactions.

\[
T_1 : [\text{Inc}(A), \text{Dec}(B), \text{Read}(C)]
\]
\[
T_2 : [\text{Inc}(B), \text{Dec}(A), \text{Read}(C)]
\]

(i) By considering some possible schedules of the above transactions, describe carefully the concurrency permitted by strict 2PL using just shared/read and exclusive/write locks. [3 marks]

(ii) Detail a way to gain more interleaving whilst still maintaining strict 2PL. [7 marks]