National University of Computer and Emerging Sciences, Lahore Campus

	Course:	**Advance Database Concepts**	**Course Code:**	**CS451**
	Program:	**BS(Computer Science)**	**Semester:**	**Spring 2018**
	Date:	**3-Apr-2018**	**Total Marks:**	**10**
	Quiz	**3 (Indexing Techniques)**	**Weight:**	
	Section	**CS**	**Max. Time:**	

Consider a relation R(a,b,c) with 10,000 records, 1,000 blocks (10 records fit on each block), and where *a* is a non-negative integer primary key. How many blocks will be read from disk to answer the selection query $\sigma_{a>25000}(R)$ in each of the following scenarios? Assume that 100 records match the selection predicate.

Q1. Relation R is stored in an unordered (heap) file.

Q2. Relation R is stored in an ordered (sequential) file sorted on *a* and there is a B^+ tree index with search key *a*. All index blocks are already in main memory.

Q3. Relation R is stored in an ordered (sequential) file sorted on *a* and there is a B^+ tree index with search key *a*, height *x=3* and order p_{leaf} = 60. **None** of the index blocks are in memory.

Q4. Relation R is stored in an unordered (heap) file. There also exists a B^+ tree index with search key *a*. All Index blocks are already in main memory.

Q5. Relation R is stored in an unordered (heap) file. There also exists a B^+ tree index with search key *a*, height *x=3* and order p_{leaf} = 60. **None** of the index blocks are in memory.

Solution

1) We need to scan all of R for a cost of **1,000 block IOs**.

2) Since the index is clustered and the 100 matching tuples fit on 10 blocks, the cost will be approximately **10 block IOs.**

3) Index access cost x+1. Since the index is clustered and the 100 matching tuples fit on 10 blocks, the cost will be approximately 10 block IOs. Total cost **14 block IOs.**

4) Since the index is unclustered, we will potentially make one block IO for each tuple for a cost of **100 block IOs.**

5) Index access cost x+1. Since the index is unclustered, base table access cost will potentially make one block IO for each tuple i.e. 100. Total cost **104 block IOs.**