

## Advance Database Concepts (CS4064)

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Course Instructor(s)

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Roll No

BSE-6A


Section

## Sessional-2 Exam

Total Time (Hrs.): 1

Total Marks: 30

Total Questions: 4



Student Signature

**Note:** Please make sure to attempt all questions and their respective parts in the specified order. Failure to do so may result in a deduction of one mark for each incorrect part of a question.

**CLO # 2** Apply the models and approaches in order to become enabled to select and apply appropriate methods for a particular case.

**Q. No 1:** Consider a file of book data that consists of 1,000,000 records, spread over 10,000 blocks. Assume there is 4 levels of secondary index exist on BookID key attribute, and 3 levels of cluster index exist on Author non-key attribute. For each of the following selection queries, estimate the I/O cost of the best possible solution, making use of the access paths available. Justify your answer. Take any valid assumption where needed. [6]

- `SELECT * FROM book WHERE Author LIKE 'A%';` (Assume 5% of books return by this query)
- `SELECT * FROM book WHERE BookID= 7 or BookID= 9;`

**CLO # 2** Apply the models and approaches in order to become enabled to select and apply appropriate methods for a particular case.

**Q. No 2:** Assume that the frequency of access to the following queries is very high. Identify the attributes that are more appropriate to create indexes to improve the performance of these queries and mention the type of each index (B-tree, Hash, or Bitmap). [6]

Query#1: `SELECT DISTINCT c.custName, c.gender, c.city  
FROM customer c JOIN order o ON c.custID=o.custID WHERE c.maritalStatus='Single';`

Query#2: `SELECT custName, contact, highestDegree, rating  
FROM customer WHERE birthdate>= '01-Jan-2000';`

**CLO # 2** Apply the models and approaches in order to become enabled to select and apply appropriate methods for a particular case.

**Q. No 3:** Suppose you have the following search key values: 4, 15, 10, 16, 20, 12, 18, 5, 31  
Load the records with the above search key values into an expandable hash file based on extendible hashing. Show the structure of the directory at each step along with the global and local depths. Use the hash function  $h(k)=k$  and each bucket cannot hold more than 3 records. Use lower bits (i.e., Right to Left) of hash value to determine a directory entry. [8]

CLO # 2 Apply the models and approaches in order to become enabled to select and apply appropriate methods for a particular case.

Q. No 4: Assume: A block size is  $B = 512$  bytes, file has  $r = 10,000,000$  records, each record is 100 bytes long, a block pointer is  $P = 6$  bytes, a record pointer is  $P_R = 7$  bytes, and a key field for the index is 10 bytes long. A database system uses a B<sup>+</sup>-tree index on key field. A leaf node and non-leaf node are one block in size and contain as many keys (and appropriate pointers) as will fit in a block. How many blocks will this index use? Also estimate the number of block accesses needed to search for and retrieve a record from the file given its key value using the B<sup>+</sup>-tree index. Show your working. [10]

$$(P_{leaf}) * (V_{leaf} + P_R) + P < B$$