King Fahd University of Petroleum and Minerals

Information and Computer Science Department

ICS 424: Advanced Database Systems
Second Semester (062)

EXAM #1 (18%)

DO NOT OPEN UNTIL INSTRUCTED TO DO SO!!!!

Write clearly, precisely, and briefly!!

ID:	
Name:	

Grades		
Section	**Max**	**Scored**
A	**20**	
B	**20**	
C	**20**	
TOTAL	**60**	

A. Questions from Chapter 13 (Storage organization) (20)

1. For what kind of tables would you use each of the following basic file organizations?

   a. Heap **(3)**

   b. Index sequential **(3)**

   c. Hash **(3)**

   d. B+Tree **(3)**

2. Assume the following query:

```
SELECT *
FROM students
WHERE sid = "234567";
```

Assume ID is the primary key of the STUDENTS table and the data records of the table are stored in 64 blocks. On the average, how many disk blocks will be accessed to answer the above query, if the STUDENT table:

a. Was organized as heap and linear search was used to find the record? **(2)**

b. Was organized as sequential file and sequential scan was used to find the record? **(2)**

c. Was organized as sequential file and binary search was used to find the record? **(2)**

d. Was organized as hash where there are no overflow blocks. **(2)**

B. Questions from Chapter 14 (Index structures) (20)

1. Assume the following parameters of a STUDENT table:

Number of records:	100,000,000
Number of data records per block:	25
Number of B+tree index records per block:	200

a. In how many data blocks is the STUDENT table stored. **(5)**

b. How many index blocks are there at each level of a B+tree built for the STUDENTS table. **(10)**

c. How many disk blocks are accessed to answer the following query? Assume the B+tree of question (b) was built using **sid**. **(5)**

```
SELECT *
FROM students
WHERE sid = "234567";
```

C. Questions from Chapter 15 (Query optimization) (20)

1. Assume the data records of a STUDENT table are stored in 64 blocks. If the memory area allocated for sorting a table is 9 blocks, how many disk accesses will be done to answer the following query? Assume there is no index on the column ***name***. (Show all your steps in detail) **(10)**

```
SELECT *
FROM students
ORDER BY name;
```

2. Assume the data records of a STUDENTS table are stored in 64 blocks and that of the HOUSING table are stored in 8 blocks. Also, assume that the size of the memory allocated for queries is 9 blocks. How many disk accessed are needed to answer the following query if an efficient join algorithm is used. (Show the steps of the join algorithm in detail). **(10)**

```
SELECT *
FROM students s, housing h
WHERE s.sid = h.sid;
```