**Tutorial 5**

**GC 312**

**Problem 1:**

Consider a disk with block size **B=512 bytes**. A block pointer is **P=6 bytes** long, and a record pointer is **P R =7 bytes** long. A file has **r=30,000 EMPLOYEE records** of fixed-length. Each record has the following fields: NAME (30 bytes), SSN (9 bytes), DEPARTMENTCODE (9 bytes), ADDRESS (40 bytes), PHONE (9 bytes), BIRTHDATE (8 bytes), SEX (1 byte), JOBCODE (4 bytes), SALARY (4 bytes, real number). An additional byte is used as a deletion marker.

1. Calculate the record size R in bytes.

(b) Calculate the blocking factor bfr and the number of file blocks b assuming an

unspanned organization.

(c) Suppose the file is ordered by the key field SSN and we want to construct a primary index on SSN. Calculate

(i) The index blocking factor bfr i

(ii) The number of first-level index entries and the number of first-level index blocks.

(iii) The number of levels needed if we make it into a multi-level index.

(iv) The total number of blocks required by the multi-level index.

(v) The number of block accesses needed to search for and retrieve a record from the file--given its SSN value--using the primary index.

**Problem 2:**

A PARTS file with Part# as key field includes records with the following Part# values: 23, 65, 37, 60, 46, 92, 48, 71. Suppose the search field values are inserted in the given order in a B + -tree of order p=4 and p leaf =3; show how the tree will expand and what the final tree looks like.

**Problem 3:**

Suppose that the following search field values are deleted, in the given order, from the B + -tree of Problem 2, show how the tree will shrink and show the final tree. The deleted values are: 65, 92, and 37.