Database Implementation CSL771
Major

○ State all assumptions that you may make in answering the questions.

○ Be brief and concise in your answers.

Question 1: Consider a relational algebra expression of the form sigma[c] (pi[l] (R X S)). Suppose that the equivalent expression with selections and projections pushed as much as possible, taking into account only relational algebra equivalences, is in one of the following forms. In each case give an illustrative example of the selection conditions and the projection lists (c, l, c_1, l_1, etc.).   **15**

(i) Equivalent maximally pushed form:

        sigma[c_1] (pi[l_1] (sigma[c_2] (pi[l_2] (R)) X S)).

(ii)Equivalent maximally pushed form:

        pi[l] (sigma[c_1] (pi[l_1] (pi[l_2] (sigma[c_2] (R)) X S))).

Question 2 : Consider the following relational schema and SQL query: **15**

Suppliers(_sid: integer_, _sname_: char(20), _city_: char(20))
Supply(_sid: integer, pid: integer_)
Parts(_pid: integer_, _pname_: char(20), _price_: real)

     SELECT S.sname, P.pname
     FROM   Suppliers S, Parts P, Supply Y
     WHERE S.sid= Y.sid AND Y.pid = P.pid AND
                  S.city = 'Delhi' AND P.price <= 2000

(i) What information about these relations will query optimizer need to select a good query execution plan for the given query?

(ii) How does adding DISTINCT to the SELECT clause affect the plans produced ?

(iii)How does adding GROUP BY sname to the query affect the plans produced ?

Question 3: Consider a disc with a sector size of 512 bytes, 2000 tracks per surface, 50 sectors per track, 5 double sided platters, average seek time of 10 msec.   **6**

(i) What is the capacity of a track in bytes? What is the capacity of each surface? What is

the capacity of the disc?

(ii) If the disc platter rotate at 5400 rpms, what is the maximum rotational delay?

(iii) Assuming that one track of data can be transfered per revolution, what is the transfer rate?

Question4: (a)How is the referential integrity constraint enforced in SQL servers? In which tables it is stored?   4

(b) State the structure of a data row. What would be length of a data row (together with all meta data about the row) with 6 columns having combined data field length of 30 bytes (all of fixed length).   4

(c) Why are fixed data fields stored before variable data fields?   4

(d) What are different types of database files? What is the type of index data files?   4

Question 5: (a) Determine expression for get next record of an indexed sequential file. 4

(b) State the organization in which delete acts physically (immediately).   3

(c)Determine bulk transfer in case of Indexed Sequential file.   4

(d)How does batching of keys help in searching a sorted file? Determine the benefit if we bunch (i) two keys, (ii) three keys.   4

(e) How is overflow treated in indexed files.   3