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CSL 332 DBMS
MAJOR

Time - 2 hrs
Max Marks- 75

Note-

- Be precise in your answers and give justification
- Make suitablc assumptions whenever necessary and specify them

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Q 1. Consider the relation

Executives (ename , titile, dname, address)
The domains of all attributes are string fields of the same length, and ename is candidate key. The relation eontains 10000 pages and there are 10 buffer pages.
Consider the Query

SELECT DISTICT title, ename FROM Executives

a) Suppose that a clustered B+ tree index on title is available .Determine the best query plan and its cost . If an additional index (on any seareh key) is available, would it help to produce a better plan? **9**

b) Suppose thc query is **5**

SELECT title, ename FROM Exeeutives.

Determine the best plan and the cost. Would any index or sorting improve the plan?

Q 2. Consider a relation R(a,b,c,d,e) containing 10,000 records where eaeh data page of the relation holds 10 records. R is organized as sorted file with dense index. Assume that attribute a is a eandidate key with values lying in the range 0 to 9999 and R is stored in order of attribute a. For cach of the following 4 relation algebra queries, state which of the following approaehes is most likely to be eheapest.

- Access the sorted file for R direetly
- Use a elustered B+ index on attribute a
- Use a linear hashed index on a **8**

i. $\sigma_{a<5000}(R)$
ii. $\sigma_{a=5000}(R)$
iii. $\sigma_{a>5000 \wedge a<6000}(R)$
iv. $\sigma_{a\neq5000}(R)$

Q 3. Determine the estimates of sizes of expression of queries in Q2 above (assuming that a is not candidate key). **8**

Q 4. Consider the relations
movieStar(name, address, gender, bdate)
movieExec(name, address, cert_no, networth)

a) write SQL queries to determine **8**
   i) pairs eonsisting of a star and an exeeutives with the same address

ii) movieStars who share the same address

b) Convert the SQL expressions in part (a) to relational algebra 4

Q 5.

a) Given the set of Fds F={ A->BCD, CD->E, E->CD, D->AH, ABH-> BD, DH-> BC } over R (ABCDEH), determine a non-redundant cover. Is it unique? 5

b) Determine a lossless decomposition of R(ABCDE) with 4
F= {A->BCDE, B->ACDE, C->ABDE }

c) Determine the closure of set of attributes BCD for the schema R (ABCDEF) with FDs F= {A->CE, B->D, C->ADE, BD->F} 4

d) Prove that X->Y follows from Armstrong Axioms iff $Y \subseteq X^+$ 6

Q 6.

a) Write an iterator for natural join of two relations R and S. 6

b) How much memory do we need to use a two pass, sort based algorithm for relations of 10000 blocks each if the operation is

i) δ (Duplicate eliminations on one of them). 4

ii) A binary operation such as join or union. 4