Birla Institute of Technology & Science-Pilani
Hyderabad Campus
2nd semester 2015-16
Database Systems (CS F212)
Test-II (Regular)

Dt: 11.04.2016 Weightage: 20% Time: 1 Hr. Type: Closed Book

Instructions: (i) Write your answers for PART-A, on the first page of your main answer booklet. (ii) Overwriting not permitted for PART-A answers. (iii) No additional sheets are supplied. Hence use the space in main booklet accordingly.

PART-A (1X10=10M)

1. If we have Functional dependencies (FDs): X→Y and WY→Z then according to inference rules, XY→Z is a valid FD. [T/F]

2. Which of the following IRs is not part of Armstrong's Inference rules. [ ]
   (a) Reflexive (b) Transitive (c) Union (d) Augmentation

3. Which of the following is true in case of Unordered file organization (to store data records) in DBMS storage. [ ]
   (a) Always requires Indexing to retrieve a record with given key value (b) Searching for a record with given key value takes constant time (c) Insertion of a record with given key value is always much easier than searching for a record (d) It requires unspanned record organization only.

4. It is not possible to construct an index on non-ordering key field of a relation. [T/F]

5. If we have 1124 data blocks to store records of a data file with Bfr=3, and if records are ordered in ascending order on the PK attribute of the table, then we need ___number of block accesses to retrieve a record with given key(PK) value. No indexing is available. [ ]
   (a) 9 (b) 10 (c) 11 (d) 12

6. In multilevel indexing (with root), the number of block accesses needed to access a record with a given key value is dependent on number of records in the top level (root) block. [T/F]

7. In a disk-pack with uniform structure across surfaces and tracks, the number of cylinders is same as____. [ ]
   (a) Number of surfaces that actually store data (b) Number of tracks per surface (c) Number of sectors per track (d) Number of blocks per surface

8. In Extendible hashing the number of initial buckets allocated to the file depends on____. [ ]
   (a) Initial Global Depth (b) initial Local Depth (c) Mod function used (d) Blocking Factor

9. The highest Normal Form satisfied by the relation R(A,B,C,D,E) with FDs { AC--> B; B-->C; AC-->E } is__ . [ ]
   (a) 1NF (b) 2NF (c) 3NF (d) BCNF

10. 4NF is based on ____. [ ]
    (a) join dependency (b) lossy dependency (c) multivalued dependency (d) cover dependency

PART-B

Q1. (a) Assume a situation where we have 9,58,000 records to be stored in a file. The record length is 75 Bytes and the block size is 512 Bytes. The address of any disk block needs 4 Bytes, and the key field of the file is of 5 Bytes length.

Now do the following.

(i) If no indexing is done, give the number of block accesses needed (worst) to retrieve a record with given key value from the above file. Also give number of data blocks needed to store the data.

(ii) Now, design a multilevel index with only two levels for the above file on the key attribute. Give how many index blocks are needed at 1^{st} and 2^{nd} level, and give the number of block accesses needed to retrieve a record with given key value from the file using two level indexing structure.

Note: Assume unspanned record organization. [7]

(b) What is the difference between B Tree and B+ tree used for indexing? [3]

Q.2 (i) Give the procedure in steps, to decompose a relation in 3NF and not in BCNF, to BCNF. Now schema of R is given as R(A,B,C,D) and FDs are {AB→CD; C→A}. As such R is not in BCNF. Apply the steps to bring R to BCNF.

(ii) Assume that we have a relational ***R*** with schema ***R(A,B,C,D,E,F)*** , with the following set (***F)*** of functional dependencies.

F={A→B; C→{E,F}; A→{C,D} } . If ***R*** is decomposed into three relations- ***R1(A,C), R2(C,E,F), R3(A,B,D)***. Now check if this decomposition is dependency preserving or not.

[*Note*: Give complete working in steps]. [4+6=10]

Q.3 (a) Assume a Diskpack with uniform surface configuration with following specifications. There are 10 double sided disks in the Diskpack. There are 128 tracks on each surface. Each track has 512 blocks. The block size is 1024 Bytes.

(i) Give the capacity of each cylinder in KB.

(ii) Give the capacity of each surface in MB.

(iii) Give the total capacity of the Diskpack in GB.

(Note: you need to give the final computed figure in MB/GB as asked; do not leave calculations incomplete; treat 1024 Bytes as 1KB, 1024 KB as 1MB, 1024 MB as 1GB) [5]

(b) Brief on working of Static External Hashing scheme? How do we resolve collision in static external hashing? You may use simple example diagrams to explain the concept. [5]

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