Indian Institute of Information Technology, Sri City, Chittoor

Name of the Exam: Database Management Systems Duration: 1.5hr Max. Marks: 20

Roll No.:_____Room No.: _____Seat No.: _____

Name: _____Invigilator's Signature: _____

Instructions: 1. All questions have to be answered in the box space provided only.
2. You have to do rough work in the question paper if required in the last sheet.

Q1. Multiple Choice Questions. Write the answer for the following questions in the space provided. Only one answer to be selected. (5 marks)

i) Given a relational schema R

X	Y	Z
1	4	2
1	5	3
1	6	3
3	2	2

Which of the following functional dependencies is valid?

a. XY->Z and Z->Y
b. YZ->X and Y->Z
c. YZ->X and X->Z
d. XZ->Y and Y->Z

Ans: [ ]

ii) Consider the relation schema R(ABCDEFGH) with following functional dependencies:
A->BC, CD->E, E->C, D->AEH, ABH->BD, DH->BC, BCD->H
Find closure $(BCD)^+$?

a. ABCDEH
b. AEFGH
c. AEH
d. BCDEFH

Ans: [ ]

iii) Clustering index is:

a. Ordered, Distinct
b. Ordered, Non-Distinct
c. Unordered, Distinct
e. Unordered, Non-Distinct

Ans: [ ]

iv) Which of the following is the syntax for views where v is view name?

a. Create view v as “table name”;
b. Create “query expression” as view;
c. Create view v as “query expression”;
d. Create view “query expression”;

Ans: [ ]

v) Which of the following is a physical storage media ?

a. Tape Storage
b. Optical Storage
c. Flash memory
d. All of the mentioned

Ans: [ ]

Q2. Subjective Questions. Answer the following questions in the space provided only. (3 marks)

i) Consider the bank database as below:

branch(<u>*branch_name*</u>, *branch_city*, *assets*)
customer (<u>*customer_name*</u>, *customer_street*, *cust omer_city*)
loan (<u>*loan_number*</u>, *branch_name*, *amount*)
borrower (<u>*customer_name*</u>, <u>*loan_number*</u>)
account (<u>*account_number*</u>, *branch_name*, *balance*)
depositor (<u>*customer_name*</u>, <u>*account_number*</u>)

Let us define a view branch_cust as follows:

```
create view branch_cust as
    select branch_name, customer_name
    from depositor, account
    where depositor.account_number = account.account_number
```

Suppose that the view is materialized; that is, the view is computed and stored. Write triggers to maintain the view, that is, to keep it up-to-date on insertions to depositor or account. Do not bother about updates.

ii) Explain the different types of Single-Level Ordered Indexes giving examples of each.

iii) Give 2 differences between SRAM and DRAM.

Q.3: Indexing (3 marks)
Construct a B+ tree for the following set of key values:
(2, 3, 5, 7, 11, 17, 19, 23, 29, 31)
Assume that the tree is initially empty and values are added in ascending order. Construct B+ trees for the cases where the number of pointers that will fit in one node (Order of the tree) is as follows:
a. Four
b. Six
c. Eight
For only B+ tree as above (a) part i.e. number of pointers that will fit in one node=4, show the form of the tree after each of the following series of operations:
a. Insert 9.
b. Insert 10.
c. Insert 8.
d. Delete 23.
e. Delete 19.

Q. 4: Hashing (3 marks)

Suppose that we are using extendable hashing on a file that contains records with the following search-key values:

2, 3, 5, 7, 11, 17, 19, 23, 29, 31

Show the extendable hash structure for this file if the hash function is

$h(x) = x \bmod 8$ and buckets can hold three records.

Show how the extendable hash structure as above changes as the result of each of the following steps:

a. Delete 11.

b. Delete 31.

c. Insert 1.

d. Insert 15.

Q5. Normalization (2+1+3=6 marks)

i) Normalize the relation table R(ABCDEFGHIJ) with following functional dependencies: AB->C, A->DE, B->F, F->GH, D->IJ. Find the default normal form in this.

ii) Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values. F={CH→G, A→BC, B→CFH, E→A, F→EG} is a set of functional dependencies (FDs) so that F^+ is exactly the set of FDs that hold for R. How many candidate keys does the relation R have? Explain the steps in detail.

iii) Find the normal forms in the following. Find candidate keys in each and explain the intermediate steps in detail.

a) R(ABCDEF): A->BCDEF, BC->ADEF, DEF->ABC
b) R(ABCDE): A-> B,BC->E,DE->A
c) R(ABCDEF): A->B, C->F,E->A,EC->D

ROUGH WORK