MIS Number | | | | | | | | | |

COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Govt. of Maharashtra)

EndSem–Nov. 2013

Data Base Management System

Class: - T.Y. B.Tech (Computer Engineering &Information Technology)

Year: - 2013-14 **Semester: - V**

Duration: - 3 hrs **Max. Marks: - 60**

Instructions:

1. ***All the Questions are compulsory.***
2. ***Assume suitable data whenever necessary.***
3. ***Draw neat figures wherever required***
4. ***Figures to right indicate full marks***

Q 1

a **Define** **6**

- Data Dictionary
- DDL, DML,
- Data Independence,
- Data Integrity,
- Metadata,
- Database Catalogue

b Describe various components of DBMS **2**

c Explain the concept of physical data independence, and its importance in database systems. **2**

Q 2

a Consider a database used to record the marks that students get in different exams of different course offerings (sections). **4**

Construct an E-R diagram that models exams as entities, and uses ternary relationship, for the database. Construct an alternative E-R diagram that uses only a binary relationship between student and section. Make sure that only one relationship exists between a particular student and section pair, yet you can represent the marks that a student gets in different exams.

b A weak entity set can always be made into a strong entity set by adding to its attributes the primary-key attributes of its identifying entity set. Outline what sort of redundancy will result if we do so. **3**

c Distinguish total and partial constraints. **3**

Q 3

a Compare BCNF and 3NF **3**

b Consider a relation such as sec-course, generated from a many-to-one relationship sec-course. Do the primary and foreign key constraints created on the relation enforce the many-to-one cardinality constraint? Explain why. **3**

c Suppose that we decompose the schema r (A, B, C, D, E) into **4**

r1 (A, B, C)
r2 (A, D, E)

Show that this decomposition is a lossless decomposition if the following set F of functional dependencies holds:

$A \rightarrow BC$
$CD \rightarrow E$
$B \rightarrow D$
$E \rightarrow A$

Q 4

a Construct a B+ -tree for the following set of key values: (2, 3, 5, 7, 11, 17, 19, 23, 29, 31) **6**

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 is as follows:

- Six
- Four
- Eight

b Is it possible in general to have two clustering indices on the same relation for different search keys? Explain your answer. **4**

OR

c Consider following relation

Sailors(sid, sname, rating, age)
Boats(bid, bname,color)
Reserves(sid, bid, day)

Write SQL queries to

1.Find the names of sailors who have reserved a red boat.
2.Find the sailor with highest rating.

Q 5

a Discuss the problems of deadlock and different approaches to deal with these problems. **4**

OR

Illustrate the working of 2-phase locking protocol with an example

b Given a relation S(student, subject, marks), write a query to find the top n students by total marks, by using ranking. **3**

c Compare log-based recovery with the shadow-copy scheme in terms of their overheads, for the case when data is being added to newly allocated disk pages (in other words, there is no old value to be restored in case the transaction aborts). **3**

Q 6

a Explain the difference between a system crash and a "disaster." **2**

b Discuss different type of transaction failures that may occur in database environment? **2**

c **6**

T1 : read(A);
read(B);
if A = 0 then B := B + 1;
write(B).
T2 : read(B);
read(A);
if B = 0 then A := A + 1;
write(A).

Add lock and unlock instructions to transactions T1 and T2 , so that they observe the two-phase locking protocol. Can the execution of these transactions result in a deadlock?