



# COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)  
SHIVAJI NAGAR, PUNE - 411 005

## END Semester Examination

### (CT-09003) Database Management System

Course: B.Tech

Branch: Computer Engineering

Semester: Sem V

Year: 2014-2015

Max.Marks:60

Duration: 3 Hours Time:- 2 to 5 p.m

Date: 29 NOV 2014

#### Instructions:

MIS No.

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1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of anything like stationery, calculator is not allowed.
5. Assume suitable data if necessary.
6. Write your MIS Number on Question Paper

**Q1** Choose the correct alternative for the following questions (each question carries 1 10 marks):

**a** A table has fields F1, F2, F3, F4, and F5 with the following functional dependencies:

F1→F3

F2→F4

(F1,F2)→F5

in terms of normalization, this table is in

- (a) 1NF (b) 2NF (c) 3NF (d) None of these

**b** Which of the following is TRUE?

- (a) Every relation in 2NF is also in BCNF  
(b) A relation R is in 3NF if every non-prime attribute of R is fully functionally dependent on every key of R  
(c) Every relation in BCNF is also in 3NF  
(d) No relation can be in both BCNF and 3NF

**c** Four DML commands are

- (a) CREATE, UPDATE, DELETE, SELECT  
(b) INSERT, UPDATE, DROP, SELECT  
(c) CREATE, ALTER, DELETE, SELECT  
(d) INSERT, MODIFY, DELETE, SELECT  
(e) INSERT, UPDATE, DELETE, SELECT

**d** Consider the table Employees (empno, first\_name, last\_name, total\_sales)  
To list the names and total sales for the employees with the highest TOTAL\_SALES (not null value) within the EMPLOYEES tables which is true for the above statement

- (a) SELECT first\_name, last\_name, total\_sales FROM employees WHERE total\_sales = (SELECT MAX(total\_sales) FROM employees);  
 (b) SELECT first\_name, last\_name, total\_sales FROM employees WHERE total\_sales >= ALL (SELECT total\_sales FROM employees);  
 (c) Both are true (d) None of the above are true
- e** An M:N relationship can decomposed into  
 (a) two 1:1 relationships (b) a 1:1 relationship and a 1:M relationship  
 (c) two 1:N relationships (d) None of the above
- f** If 'N' number of tables joined should have a  
 (a) Maximum of 'N-1' join clauses (b) Minimum of '1' join clause  
 (c) Maximum of 'N' join clauses (d) Minimum of 'N-1' join clauses
- g** Consider the following relational schema pertaining to a student's database:  
 Students (rollno, name, address )  
 Enroll( rollno, courseno, coursename)  
 Where primary keys are shown in italics. The number of tuples in the student and Enroll tables are 120 and 8 respectively. What are the maximum and minimum number of tuples that can be present in (Student \*Enroll), where \* denotes natural join?  
 (a) 8,8 (b) 120,8 (c) 960,8 (d) 960,120
- h** Which of the following concurrency control protocols ensure both conflict serializability and freedom from deadlock?  
 1. 2 phase locking  
 2. Time stamp ordering  
 (a) 1 only (b) 2 only (c) both 1 and 2 (d) neither 1 nor 2
- i** A clustering index is defined on the fields which are of type.  
 (a) non key and ordering (b) non key and non-ordering  
 (c) key and ordering (d) key and non-ordering
- j** Consider the following schedules involving two transactions. Which one of the following statements is true?  
 S1: r1(X); r1(Y); r2(X); r2(Y); w2(Y); w1(X)  
 S2: r1(X); r2(X); r2(Y); w2(Y); r1(Y); w1(X)  
 (a) s1 is conflict serializable and s2 is not conflict serializable  
 (b) both s1 and s2 are conflict serializable  
 (c) s1 is not conflict serializable and s2 is conflict serializable  
 (d) both s1 and s2 are not conflict serializable

**Q2**

- a** What is the difference between DATA BASE MANAGEMENT SYSTEM and RDBMS? 2
- b** What are advantages of DATA BASE MANAGEMENT SYSTEM? 2
- c** Explain how data retrieval, insertion, and deletion are done using B tree or B+ tree indices 6

OR

List out various types of Database architecture and explain any one in details.

- Q3** A Driver should own a license to drive. License has license no, license class, license expiry. License can be of type learner license and driver license. Learner license records driver's education. Driver license records restrictions. Driver has the attributes - driver serial number, driver name, driver birth date, driver address, driver city, driver postal code, driver phone. License is issued by branch after taking

examination. A branch has branch id, branch name, branch address, branch phone, branch city, branch postal code. Examination taken by driver at a branch records exam date, exam score, exam type. The date when branch issues license is recorded.

- a Construct a clean and concise ER diagram driving license office. List your 6 assumptions and clearly indicate the cardinality mappings as well as any role indicators in your ER diagram.
- b Generate from the E-R diagram the corresponding relational schema using underline 4 for keys.

**Q4**

a

Sid	Sname	Rating	Age
18	Jones	3	30
41	Jonah	6	56
22	Ahab	7	44
63	Moby	Null	15

5

A sailors instances

Consider the following query for above sailors table: Find the names of sailors with a higher rating than all sailors with age < 21. The following two SQL queries attempt to obtain the answer to this question. Do they both compute the result? If not, explain why. Under what conditions would they compute the same result?

- 1) SELECT S.sname  
FROM Sailors S  
WHERE NOT EXISTS ( SELECT \*  
FROM Sailors S2  
WHERE S2.age < 21 AND S.rating <= S2.rating )
- 2) SELECT \*  
FROM Sailors S  
WHERE S.rating > ANY ( SELECT S2.rating  
FROM Sailors S2  
WHERE S2.age < 21 )

- b Consider the relational database as below, where the primary keys are underlined. 5

Employee (PersonName, Street, City)  
Works (PersonName, CompanyName, Salary)  
Company (CompanyName, City)  
Manages (PersonName, ManagerName)

Give an expression in the relational algebra and SQL for each of the following queries:

(First query is compulsory, Answer any two from rest of three)

- (i) Find the names of all employees in this database who do not work for BOI
- (ii) Find the names, street address, and cities of residence of all employees who work for BOI and earn more than \$10,000 per annum.
- (iii) Find the names of all employees in this database who live in the same city as the company for which they work.
- (iv) Find the names of all employees who earn more than every employee of BOI.

**Q5**

- a Discuss the ACID properties of a database transaction. 4
- b Discuss the various types of 2 phase locking protocols. 6

OR

In a given schedule with 4 transactions executed concurrently. The order of their operations is given in the table. List out all the conflict operations among all operations and find out whether the given schedule is serializable or not? If not then give valid reason with explanation and graph.

T1	T2	T3	T4
R(x)	R(y) W(x)	W(z)	R(z)
W(x)	W(y)	R(x) W(y)	
Commit	Commit	W(x)	R(x) W(y)
		Commit	Commit

Q6

- a Discuss the insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with an example. 3
- b Define the first, second and third normal form and convert below table up to 3NF and underline the candidate keys. 7

Project Code	Project Title	Project Manager	Project Budget	Employee No.	Employee Name	Dept No.	Dept Name	Hourly Rate
PC010	Pensions System	M Phillips	24500	S10001	A Smith	L004	IT	22.00
PC010	Pensions System	M Phillips	24500	S10030	L Jones	L023	Pensions	18.50
PC010	Pensions System	M Phillips	24500	S21010	P Lewis	L004	IT	21.00
PC045	Salaries System	H Martin	17400	S10010	B Jones	L004	IT	21.75
PC045	Salaries System	H Martin	17400	S10001	A Smith	L004	IT	18.00
PC045	Salaries System	H Martin	17400	S31002	T Gilbert	L028	Database	25.50
PC045	Salaries System	H Martin	17400	S13210	W Richards	L008	Salary	17.00
PC064	HR System	K Lewis	12250	S31002	T Gilbert	L028	Database	23.25
PC064	HR System	K Lewis	12250	S21010	P Lewis	L004	IT	17.50
PC064	HR System	K Lewis	12250	S10034	B James	L009	HR	16.50