Registration no: | | | | | | | | | | |

Total Number of Pages: 02 **MCA**

MCC304

3rd Semester Regular / Back Examination 2016-17
DATA BASE SYSTEMS
BRANCH: MCA
Time: 3 Hours
Max Marks: 70
Q.CODE: Y670

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** (2 x 10)

a) What is referential-integrity constraint? Give an example.
b) What do you mean by recursive relationship? Give an appropriate example.
c) Discuss specialization and generalization.
d) Consider a relation R(A,B,C) has functional dependency { AB → C, C → A }. Is R in 3NF? Justify your answer.
e) Consider a relation Employee (EMP_ID, ENAME, SAL, DEPTNO). Display the department number, highest and lowest salary for each department.
f) Define Serializable schedule.
g) Explain atomicity of transaction.
h) Difference between dense index and sparse index.
i) Define view. Write the syntax for creating a view of a table in SQL.
j) Differentiate between conservation 2PL and rigorous 2PL.

Q2 a) What is data abstraction? Explain three-tier ANSI-SPARC architecture. (5)
b) Compare and contrast between Logical data independence and Physical Data Independence. (5)

Q3 a) Construct an ER diagram with proper specifications for the following company database. The company keep tracks of company's employee, project and department. Each department is managed by an employee. A department controls a number of projects and employee can work for any number of projects. The department holds the information about the employees working under specific project. The company keeps track of dependents of each employee for insurance purposes. State any additional assumptions that can be made to this model. (5)
b) What are inference rules? Prove that Armstrong's axioms are sound and complete. (5)

Q4 a) Consider the following GRADEBOOK relational schema describing the data for a grade book of a particular instructor: (5)

Catalog(Cno, Ctitle)
Student(Sid, Fname, Lname, Minit)
Courses(Term, Sec_no, Cno)
Enrolls(Sid, Term, Sec_no)
Write the following queries in Relational Algebra and SQL:

i) Retrieve the names of students enrolled in Computer_Organization class during the 2006 term.
ii) Retrieve the students who have enrolled in MCA226 and MCA227.
iii) Retrieve the names of students who have not enrolled in any class.
iv) Retrieve the names of students, course code and course name who have enrolled in all courses in the Catalog table.

b) Given a relation R={A, B, C, D, E, H} and having the following dependencies F={ { A → BC }, { CD → E}, { E → C }, { D → A E H }, { ABH → B D}, { DH→ B C} }. Find the keys for relation R. (5)

Q5 a) Given below are two sets of FDs for a relation R=(A, B, C, D, E). Are they equivalent? (5)
F_1= { A → B, AB → C, D → AC, D → E }
F_2= { A → BC, D → AE

b) Consider the following relation for published books: (5)
BOOK(Book_title, Author_name,Book_type,List_price, Author_affil, Publisher)
Author_affil refers to affiliation of author. Suppose the following dependencies exist:
{ { Book_title → Publisher, Book_type }, { Book_type → List_price }, { Author_name → Author_affil } }
What normal form is the relation in? Explain your answer. Apply normalization until you cannot decompose the relations further. State the reasons behind each decomposition

Q6 a) Define query optimization? Explain the different steps involved during query optimization in detail? (5)
b) Define B^+ tree. Discuss its structure with an appropriate example. (5)

Q7 a) Define Concurrency? Why concurrency control is needed in transaction processing (5)
b) What is a timestamp? Discuss Timestamp Ordering algorithm. Explain Thomas's Write Rule. (5)

Q8 Write short answer on any TWO: (5 x 2)

a) Tuple Relational Calculus
b) Distributed Databases
c) Multi-valued Dependency
d) Recovery using Deferred Update