

# CBCS Scheme

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16MCA23

Second Semester MCA Degree Examination, Dec.2017/Jan.2018

## Database Management System

Time: 3 hrs.

Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. What are the advantages of DBMS over Traditional File System? Explain. (08 Marks)
- b. Explain 3 – schema Architecture. What do you mean by Data Independence? Explain briefly about different types of it. (08 Marks)

OR

- 2 a. Discuss the main characteristics of Database approach and how is it differs from Traditional File system. What are the main functions of DBA? (08 Marks)
- b. Explain the centralized , Two – Tier , Three – Tier and N – Tier Client Server Architectures for DBMS. (08 Marks)

### Module-2

- 3 a. Define the term Relational Algebra expression. Explain in detail about complete set of Relational Algebra Operations with examples. (08 Marks)
- b. Write ER – To – Relational mapping algorithm, with an example. (08 Marks)

OR

- 4 Consider the following schema : (16 Marks)

EMPLOYEE (Fname, Minit, Lname, Ssn, Bdate, Address, Gender, Salary, Super Ssn, Dno)

DEPARTMENT (Dname, Dnumber, Mgr, Ssn, Mgr\_Start\_date)

DEPT\_LOCATIONS (Dnumber, Dlocation)

PROJECT (Pname, Pnumber, Plocation, Dnum)

WORKS\_ON (Essn, Pno, Hours)

DEPENDENT (Essn, Dependent\_name, Gender, Bdate, Relationship)

The key fields are underlined. Answer all of the following queries in Relational Algebra.

- a. Retrieve the name and address of all employees who work for the 'Research' Department.
- b. For every project located in 'Stafford', list the project number, the controlling department number and the department managers last name, address and birth date.
- c. Find the names of employees who work on all the projects controlled by department number 5.
- d. Make a list of project numbers for projects that involve an employee whose last name is 'SMITH', either as a worker or as a manager of the department that controls the project.
- e. List the name of all employees with two or more dependents.
- f. Retrieve the names of employees who have no dependents.
- g. List the names of managers who have at least one dependent.
- h. Retrieve the social security numbers of all employees who either work in the department no 5 or directly supervise an employee who works in department no 5.

### Module-3

- 5 a. Differentiate a nested sub query and correlated sub query. What are the set operations of SQL? Discuss. (08 Marks)
- b. Explain about all integrity constraints with examples. (08 Marks)

OR

- 6 Consider the following schema : (16 Marks)
- Department (Dept\_name, Building, Budget)  
 Course (Course\_id, Title, Dept\_name, Credits)  
 Instructor (Id, Name, Dept\_name, Salary)  
 Section (Course\_id, Sec\_id, Semester, Year, Building, Room\_number, Time\_Slot\_id)  
 Teaches (Id, Course\_id, Sec\_id, Semester, Year)
- The key fields are underlined. Answer all of the following queries in SQL.
- Find the set of all courses taught in the fall 2009 as well as in spring 2010.
  - Find the number of instructors in each department who teach a course in the spring 2010 semester.
  - Select the names of instructors whose names are neither "MOZART" Nor "EINSTEIN".
  - Find the departments that have the highest average salary.
  - Find all courses taught in both the fall 2009 semester and in the spring 2010 by using exists construct.
  - Find all students who have taken all courses offered in the Biology Department.
  - Find all courses that were offered at most once in 2009.
  - Give a 5% salary raise to instructors whose salary is less than average.

**Module-4**

- Give all four informal design guidelines for relation schemas. (08 Marks)
  - Define Functional Dependency. State and prove Arm Strong's inference rules. (08 Marks)

OR

- What is Normalisation? Define 1<sup>st</sup>, 2<sup>nd</sup> and Boyce – Codd Normal forms. (08 Marks)
  - Explain about Database stored procedures and functions. Define a minimal cover. (08 Marks)

**Module-5**

- Discuss about Transaction Atomicity and Durability. What do you mean by Serializability? Explain. (08 Marks)
  - What are the levels of Transaction Isolation, do you have? How do you implement Isolation levels? Explain. (08 Marks)

OR

- Explain briefly about all Lock – Based Protocols. (08 Marks)
  - Discuss briefly about Failure classification and Recovery Algorithm. (08 Marks)

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