Total number of printed pages–4

53 (CS 401) DBMN

2021

DATABASE MANAGEMENT SYSTEM

Paper : CS 401

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. Answer the following questions : 5×4=20

   (i) Define Schema, Instance and Database state.

   (ii) What is an attribute in DBMS ? Define various types of attributes with appropriate examples.

   (iii) What are the physical, logical and view level data abstraction ?

   (iv) Explain selection and project operations with examples.

Contd.

2. Answer the following questions : 5×4=20

(a) What is normalization ? Explain 2NF and 3NF in details.

(b) What are the Physical and Logical Data Independency ?

(c) What is functional dependency ? Explain its types in detail.

(d) What are the foreign key and merged relation approaches for Mapping of Binary 1 : 1 relationship types ?

3. Answer the following questions :

(i) Explain various types of join operations with suitable examples. 10

(ii) Consider table $R(A, B, C, D, E)$ with FDs as $A \rightarrow B$, $BC \rightarrow E$ and $ED \rightarrow A$. The table is in which normal form ? Justify your answer. 5

(iii) Explain two-phase locking protocol. What are its advantages and disadvantages ? 5

4. Consider the following Relational schema : 20

EMPLOYEE (Fname, Mname, Lname, Ssn, Bdate, Address, Salary, Super_ssn, Dno.)
DEPARTMENT (Dname, Dnumber, Mgr_ssn, Mgr_start_date)
DEPT_LOCATION (Dnumber, Dlocation)
PROJECT (Pname, Pnumber, Plocation, Dnum)
WORKS_ON (Essn, Pno, Hours)
DEPENDENT (Essn, DE_name, Bdate, Relationship)

Write Relational Algebra expression and SQL query for the following :

(i) Retrieve the name and address of all employees who works for the research department.

(ii) For every project located in Stafford, list the project number, the controlling department number and the department manager's last-name, address and birth date.

(iii) Find the name of all employees who work on all projects controlled by department number 5.

(iv) Retrieve the name of all employees who have no dependent.

(v) List the name of all employees with two or more dependents.

5. Answer the following questions :

(i) Discuss the component modules of a Database Management System and their interactions with neat diagram. 15

(ii) What is the dependency preservation property for a decomposition ? Why is it important ? 5

6. Write short notes on : ***(any four)*** 5×4=20

(a) Referential Integrity

(b) Boyce-Codd normal form

(c) Database Languages

(d) Query Optimization

(e) Three-Tier Architecture.