
Total number of printed pages-4

53 (IT 402) DBMN

2021

DATABASE MANAGEMENT SYSTEM

Paper : IT 402

Full Marks : 100

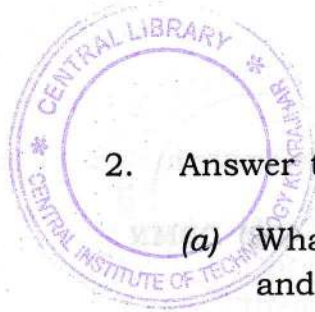
Time : Three hours

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 have no dependent.
- (iv) Find the name of all employees who work on all projects controlled by department number 5.
- (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.

