# 2022

## COMPUTER SCIENCE — HONOURS

Paper : CC-11

(Database Management System)

Full Marks : 50

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer *question no.* **1** and *any four* questions from the rest.

1. Answer *any five* questions :  2×5

    (a) What do you mean by logical data independence?

    (b) Discuss the difference between Instance and Schema.

    (c) What is the need of generalization/Specialization in the ER data model?

    (d) What is the need of referential integrity?

    (e) Distinguish between lossless decomposition and lossy decomposition.

    (f) What do you mean by full functional dependency?

    (g) Distinguish between strong and weak entity set.

    (h) What do you mean by meta data?

2. (a) Discuss the three level architecture of DBMS with suitable example.

    (b) Distinguish between data dictionary and data integrity.  5+5

3. (a) Consider the relation SUPPLIER given below, where s#, p# are keys, the functional dependency set FD is given as FD = {s# p# → city, s# → city}

SUPPLIER

| s# | X | X | X | Y | Y |
|------|-------|-------|-------|-----|-----|
| p# | 1 | 2 | 3 | 1 | 2 |
| City | Delhi | Delhi | Delhi | Goa | Goa |

Now perform the following :

    (i) Determine the highest normal form of the relation SUPPLIER.

    (ii) Discuss the deletion and insertion anomalies, which can occur in the relation SUPPLIER.

**Please Turn Over**

(2)

    (b) Construct an ER diagram for the Loan Management system of a finance company. Loans are given on the purchase of various items with different interest rates. Company keeps track of defaulters and take appropriate steps against them.     (2½×2)+5

4.   (a) Given the following relation :

Schema

| X | Y | Z |
|---|---|---|
| 1 | 4 | 2 |
| 1 | 5 | 3 |
| 1 | 6 | 3 |
| 3 | 2 | 2 |

Find out all possible functional dependencies from above schema.

    (b) Explain the various types of integrity constraints with proper examples.     5+5

5.   (a) Consider a relation schema $R = (A, B, C, D, E, H)$ on which the following functional dependencies hold : $\{A \to B, BC \to D, E \to C, D \to A\}$. What are the candidate keys of R?

    (b) Consider a relation schema $R = (L, M, N, O, P)$ on which the following functional dependencies hold: $\{M \to O, NO \to P, P \to L$ and $L \to MN\}$ Decompose the above relation into BCNF.     5+5

6.   (a) Consider the relation schema Author (Aname, Institution, Acity, Age); Publisher (Pname, Pcity); Book (Title, Aname, Pname). Write the following queries using Relational Algebra :

    (i) Get the names of all publisher.

    (ii) Get the values of all attributes of all authors who have published a book for the publisher with Pname = 'PHI'.

    (iii) Get the name of all authors who have published a book for any publisher located in 'Kolkata'.

    (b) Distinguish between primary indexing and secondary indexing.     (2+2+2)+4

7.   (a) Consider the relational tables given below and write the following SQL queries :

Employee (Empid, Ename, Salary, Deptid); Dept (Deptid, Dname, Dlocation).

    (i) Find the name of employees who are getting 2nd highest salary.

    (ii) Find the employees who are getting minimum salary.

    (iii) Find the name of employees who are working in 'CS' department and have salary greater than 10000.

    (b) "BCNF is stronger than 3NF"— Verify the statement with proper justification.     (2+2+2)+4

8.   (a) What is Query optimization? Discuss the role of Relational Algebra in query optimization.

    (b) What is Database Manager? Explain the components of database managers with the help of a diagram.     (2+3)+(2+3)