2023

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) State the advantages of RDBMS over general file system.

(b) Define Schema.

(c) What is Data Dictionary?

(d) What is Referential Integrity?

(e) What is data independence?

(f) Define weak entity set with a suitable example.

(g) Why is it necessary to remove data redundancy?

(h) Distinguish between super key and candidate key.

2. Draw a ER.Diagram for Library Management system by clearly specifying

(a) Entity names

(b) Relationship names

(c) Mapping cardinality

(d) Attributes and Primary key. 2+3+2+3

3. (a) Consider the following relational schema

Author (Aname, Institute, Acity, Age)

Publisher (Pname, Pcity)

Book (Title, Aname, Pname)

Write the following queries using Relational Algebra

(i) Get the names of all authors whose age in greater than 50.

(ii) Get the values of all attributes for all authors who have published a book for any publisher located in 'Madras'.

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

(b) Can the foreign key have NULL or duplicate values? Justify your answer briefly. (2+3+3)+2

4. (a) What is Left outer join and Right outer join? Explain with examples.

(b) Given a relation $R(A, B, C)$ and FD = $\{A \rightarrow B, B \rightarrow C, C \rightarrow A\}$. Find out the candidate keys. 5+5

5. (a) Given a relation $R(A, B, C, D)$ and $FD = \{AB \rightarrow CD, B \rightarrow C\}$. Convert it into 2NF.

(b) Given a relation $R(x, y, z, w, p)$ and $FD = \{x \rightarrow y, z \rightarrow w, w \rightarrow p\}$. Then is the decomposition of R into relation $R_1(x, y)$ and $R_2(z, w, p)$ lossy or lossless? 5+5

6. (a) Why is Armstrong's axiom is said to be 'sound' and 'complete'?

(b) Consider the relational tables given belew and write the following SQL queris :

Project (Pid, Pname, Plocation Deptid, Epid)

Department (Deptid, Dname, Dloc)

Employee (Empid, Ename, Eaddress, Deptid)

(i) Find the list of projects which are controlled by 'CS' department.

(ii) Find the list of projects located at 'Kolkata'.

(iii) Find the name of the employees who are working in the project located at 'Mumbai'. 4+(2×3)

7. (a) What is query optimization? How is relational algebra used to optimize query?

(b) Represent Division operation of relational algebra using basic relational algebra operations only.

(c) What are the necessary conditions to perform union operation in relational algebra? (2+2)+4+2

8. (a) What is the benefit of using secondary index? Give an example.

(b) Write the steps to perform insertion in Dense index.

(c) Which hashing is preferable in database : open hashing or closed hashing? Explain. (2+2)+4+2