2021

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.

Section - I

1. Answer any five questions.

 2×5

- (a) What do you mean by functional dependency?
- (b) Define loss less decomposition.
- (c) What do you mean by data redundency?
- (d) What is the requirement of specialization in the ER data model?
- (e) Explain the functionality of transitivity rule of functional dependency.
- (f) Explain the concept "Dependency preservation".
- (g) Define BCNF.
- (h) Distinguish between Generalization and Aggregation.

Section - II

Answer any four questions.

2. (a) For the relations given below, check whether the given functional dependencies hold or not. Give proper justifications.

| J : | X | X | Y | Y | Z | P |
|-----|---|---|---|---|---|---|
| K : | 1 | 1 | 1 | 1 | 2 | 4 |
| L: | 2 | 3 | 4 | 3 | 5 | 7 |

- (i) $J \rightarrow K$
- (ii) J, $K \rightarrow L$
- (b) Verify the statement, "Any relation in BCNF is in 3NF but converse is not true". Give suitable example.

Please Turn Over

- 3. (a) Explain the term data replication and data fragmentation with suitable example.
 - (b) What are integrity constraints? Explain the various types of integrity constraints with suitable examples.

 5+5
- 4. (a) Describe the 3-Level architecture of DBMS.
 - (b) Distinguish between strong and weak entity set. Draw an ER diagram to illustrate weak entity set.

 5+5
- 5. (a) How do B-Tree indexes differ from Binary Search Tree Indexes?
 - (b) Differentiate between the concepts of Logical data independence and Physical data independence in DBMS.

 5+5
- **6.** What do you understand by the term closure of a relation (R) with functional dependency set (F)? Compute the closure for the relation R(l, m, n, o, p) with functional dependency set F:

 $F \{l \to mn ; no \to p ; m \to o ; p \to l\}$ Identify the candidate keys for the relation (R).

- 7. (a) Explain referential integrity with an example.
 - (b) Consider the relation schema: Employee (Empid, Ename, deptid); Project (Projectid, Pname, deptid) Department (deptid, dname, dlocation)
 - (i) Retrieve the name of all employees who work for the 'Computer Science' department.
 - (ii) List the name of the Employees who works in "IOT" projects.
 - (iii) List the projects of "Computer Science" running at "Kolkata". 4+6
- 8. (a) Consider the relational table given below and answer the following SQL queries.

Employee (SSN-No. Name Department, Salary)

- (i) List all the employees whose name starts with the letter 'L'.
- (ii) Find the maximum salary given to employees in each department.
- (iii) Find the number of employees working in 'accounts' department.
- (iv) Find the second maximum salary from the table.
- (v) Find the employee who is getting the minimum salary.
- (b) Explain various types of Functional dependency. List and discuss the six inference rules for functional dependencies. 5+(2+3)