2020

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) Explain the concept of entity integrity.

(b) What do you mean by functional dependency?

(c) Whether relational calculus is procedural or non-procedural?

(d) Define data dictionary and explain metadata.

(e) What is alternate key?

(f) State the problems caused by data redundancy.

(g) What is the requirement of specialization in the ER data model?

(h) What do you understand by transitivity rule of functional dependency?

2. (a) Describe the three-level architecture of DBMS.

(b) Explain the difference between physical and logical data independence.

(c) State the differences between schema and instance. 5+3+2

3. (a) What do you understand by the term closure of a relation (r) with functional dependency set (F)?

(b) Compute the closure for relation r {l, m, n, o, p} with functional dependency set F as given below :

$F = \{l \rightarrow mn;\ no \rightarrow p;\ m \rightarrow o;\ p \rightarrow l\}$

Identify the candidate key for the relation (r). 2+(5+3)

4. (a) Compare between 3NF and BCNF with example.

(b) Discuss the 'insertion anomalies', 'updation anomalies' and 'deletion anomalies' with respect to normal forms with suitable examples and suggest a method to overcome them.

(c) What is lossless decomposition? 3+5+2

Please Turn Over

5. (a) Explain full outer join, left outer join, right outer join with example.

(b) Consider the relation schemas :

STUDENT (student_id, name)

ENROLLEDIN (student_id, subject_code)

SUBJECTS (subject_code, teacher)

Write relational algebra for the following :

(i) Who teaches CP 1500 or CP 3020?

(ii) What are the names of the students taking a subject taught by Roger? 5+5

6. Consider following two relation schemas :

Employee (eno, ename, job, hiredate, managerno, salary, comm., dno)

Dept (dno, dname, location)

Solve the following queries using SQL :

(a) List the name of the employee whose name either starts or ends with "S".

(b) List the department name and the total salary payable in each department.

(c) List out the employees who earn more than the average salary of their department. 3+3+4

7. (a) Suppose schema R = (A, B, C, D, E) with F = (A $\rightarrow$ BC, CD $\rightarrow$ E, B $\rightarrow$ D, E $\rightarrow$ A) is decomposed into (A, B, C) and (A, D, E). Show that this decomposition is lossless-join decomposition.

(b) State some advantages and disadvantages of Normalization. 5+5

8. (a) Differentiate between sparse index and dense index.

(b) With example explain how secondary index is used in database application.

(c) Give an example where you will prefer the following :

(i) Indexing in database.

(ii) Hashing in database. 3+3+4
