

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FIFTH SEMESTER EXAMINATION, MARCH 2021

THIRD YEAR [BATCH 2018-21]

COMPUTER SCIENCE [Honours]

Date : 13/03/2021

Time : 11.00 am – 1.00 pm

Paper : V [Gr.A]

Full Marks : 40

Answer any four questions from question nos. 1 to 6

[4×10]

1. a) Draw an Entity Relationship Diagram of Banking Information System.
b) Discuss the term i) Derived attribute and ii) Natural Join in Relational algebra [5+(2.5+2.5)]
2. a) Consider a Relation R(ABCDEFG) and a set of Functional Dependency $F = \{AB \rightarrow C, AC \rightarrow B, AD \rightarrow E, B \rightarrow D, BC \rightarrow A, E \rightarrow G\}$ decomposed into $D1 = R_1(AB), R_2(BC), R_3(ABDE), R_4(EG)$. Find whether D1 is Lossless or Lossy ?
b) Find the minimal cover of the set of functional dependencies given; $\{A \rightarrow C, AB \rightarrow C, C \rightarrow D, CD \rightarrow I, EC \rightarrow AB, EI \rightarrow C\}$ [5+5]
3. a) Discuss about different states of DBMS Transaction.
b) Briefly discuss about Sparse and Dense indexing? [5+5]
4. a) Consider the Relation R(ABCDEFGH) and
 $FD : \{AB \rightarrow C, AC \rightarrow B, AD \rightarrow E, B \rightarrow D, BC \rightarrow A, E \rightarrow G\}$ Decompose the Relation R till BCNF.
b) A relation R is defined as $R = (\text{name, street, city, state, postal_code})$ Here, name is unique, and for any given postal code, there is just one city and state. What are the candidate keys? Is R in 3NF? 2NF? Explain why? If R is not in 3NF, normalize it into 3NF relations. [5+5]
5. a) What is the difference between serial and serializable schedule?
b) Consider the Relation R(ABCDEFG) and Functional Dependency
 $F = \{AB \rightarrow C, AC \rightarrow B, BC \rightarrow A, AD \rightarrow E, B \rightarrow D, E \rightarrow G\}$
 $D = \{ABC, ACDE, ADG\}$
Check whether the decomposition D is preserving dependency or not? [5+5]
6. Consider the following Database Schema:
person (driver-id#, name, address)
car (license, model, year)
accident (report-number, date, location)
owns (driver-id#, license)
participated (driver-id, car, report-number, damage-amount)

Write down the following SQL Queries:

[5×2]

- i. Find the total number of people who owned cars that were involved in accidents in 2018.

- ii. Find the number of accidents in which the cars belonging to “John Smith” were involved.
- iii. Add a new accident to the database; assume any values for required attributes.
- iv. Delete the Mazda belonging to “John Smith”.
- v. Update the damage amount for the car with license number “WB42AN20” in the accident with report number “AR2197” to Rs.50000.

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