

Time: 3 Hours

DECEMBER 2014

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

- a. Which of the following contains a complete record of all the activities that affected the contents of a database during a certain period of time?
- (A) Report writer (B) Query language
(C) Data manipulation language (D) Transaction log
- b. In SQL, which command is used to add new rows to a table?
- (A) ALTER TABLE (B) ADD ROW
(C) INSERT (D) APPEND
- c. The highest level in the hierarchy of data organization is called
- (A) Data bank (B) Data base
(C) Data file (D) Data record
- d. The physical location of a record is determined by a mathematical formula that transforms a file key into a record location in
- (A) A tree file (B) An indexed file
(C) A hashed file (D) A sequential file
- e. A locked file can be
- (A) Accessed by only one user
(B) Modified by users with the correct password
(C) Is used to hide sensitive information
(D) Both (B) and (C)
- f. The master list of an indexed file
- (A) Is sorted in ascending order
(B) Contains only a list of keys and record numbers
(C) Has a number assigned to each record
(D) Both (B) and (C)

- g. Related fields in a data base are grouped to form
- (A) Data file (B) Data record
(C) Menu (D) Bank
- h. In the DBM approach, application programs perform the
- (A) Storage function (B) Processing functions
(C) Access control (D) All of these
- i. Periodically adding, changing and deleting file records is called file
- (A) Updating (B) Upgrading
(C) Restructuring (D) Renewing
- j. In SQL, the _____ command is used to recompile a view
- (A) COMPILE VIEW (B) DEFINE VIEW
(C) CREATE VIEW (D) ALTER VIEW

**Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.**

- Q.2** a. Explain different levels of data abstraction. (8)
- b. We can convert any weak entity set to a strong entity set by simply adding appropriate attributes. Why, then do we have weak entity sets? (5)
- c. Explain the distinction between total and partial constraints. (3)
- Q.3** a. Given the following relations:
- Vehicle (reg-no, make, colour)
Person (eno, name, address)
Owner (eno, reg-no)
- Write expressions in relational algebra to answer the following queries:
- (i) List the names of persons who do not own any car.
(ii) List the names of persons who own only Maruti Cars. (8)
- b. Define the following:
- (i) Theta Join
(ii) Outer Join (4)
- c. Given the relations R(A,B,C) and S(C,D,E,F) give an expression in tuple relational calculus that is equivalent to each of the following : (4)
- (i) $\prod_{A,B,C}(R)$
(ii) $\sigma_{E=10}(S)$
(iii) $R \bowtie S$
(iv) $R \cup S$
- Q.4** a. Explain the purpose of the integrity constraint, in the SQL create table statement, relating to foreign keys. (5)

- b. Consider the following relations with underlined primary keys. (3+3+3)
 Product (P_code, Description, Stocking_date, QtyOnHand, MinQty, Prices, Discount, V_code)
 Vendor (V_code, Name, Address, Phone)
 Here a vendor can supply more than one product but a product is supplied by only one vendor. Write SQL queries for the following:
 (i) List the names of all the vendors who supply more than one product.
 (ii) List the details of the products whose prices exceed the average product price.
 (iii) List the Name, Address and Phone of the vendors who are currently not supplying any product.
- c. What are the advantages of having an index structure? (2)

- Q.5** a. Suppose that we decompose the schema $R = (A, B, C, D, E)$ into (A, B, C) and (A, D, E) .
 Show that this decomposition is a lossless – join decomposition if the following set F of functional dependencies holds: (4)
 $A \rightarrow BC$
 $CD \rightarrow E$
 $B \rightarrow D$
 $E \rightarrow A$
- b. Compute the closure of the following set F of functional dependencies for relation schema (6)
 $R = (A, B, C, D, E)$
 $A \rightarrow BC$
 $CD \rightarrow E$
 $B \rightarrow D$
 $E \rightarrow A$
 List the candidate keys for R .
- c. Given relation $R(W, X, Y, Z)$ and set of functional dependencies $G = \{Z \rightarrow W, Y \rightarrow XZ, XW \rightarrow Y\}$, where G is a minimal cover: (6)
 (i) Decompose R into a set of relations in Third Normal Form.
 (ii) Is your decomposition in part (i) also in Boyce Codd Normal Form? Explain your answer.

- Q.6** a. Define and differentiate between ordered indexing and hashing. Give illustrative examples. (8)

- b. What is indexed sequential file organization? What are the applications of this organization? How are indexes implemented in the case of multiple keys? (8)

- Q.7** a. What is meant by heuristic optimization? Discuss the main heuristics that are applied during query optimization. (8)

- b. How does a query tree represent a relational algebra expression? Discuss any three rules for query optimization, giving example as to when should each rule be applied. (8)
- Q.8** a. Describe each of the following locking protocols: (5)
- (i) 2PL
 - (ii) Strict 2PL
- b. What is a deadlock and how do most DBMS handle deadlocks? (5)
- c. How does the two phase protocol ensure serializability in database schedules? (6)
- Q.9** a. Compare shadow paging with log based recovery methods. (8)
- b. Define check point and its impact on data base recovery. (8)