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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech III Semester End Examinations (Supplementary) - January, 2019

Regulation: IARE – R16

## DATABASE MANGEMENT SYSTEMS

**Time: 3 Hours**

**(IT)**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

### UNIT – I

1. (a) What is Database Administrator(DBA)? Discuss the functions of DBA? [7M]
- (b) An E-R diagram can be viewed as a graph. What do the following mean in terms of the structure of an enterprise schema? [7M]
  - i. The graph is disconnected.
  - ii. The graph is acyclic.
2. (a) Why query processor component of database system is important? Briefly discuss about all components of query processor? [7M]
- (b) Design a generalization–specialization hierarchy for a motor-vehicle sales company. The company sells motorcycles, passenger cars, vans, and buses. Justify your placement of attributes at each level of the hierarchy. Explain why they should not be placed at a higher or lower level. [7M]

### UNIT – II

3. (a) Explain how the renaming operator is used? If this operator is not allowed is there any query that can no longer be expressed in algebra? [7M]
- (b) Consider the following schema: [7M]

Sailors (Sid: integer,sname: string, rating :integer, age :real)

Boats (bid : integer, bname : string, colour :string)

Reserves (sid : integer, bid : integer, day: date)

Write the following queries in relational algebra

  - i. Find the names of sailors who have reserved boat 103
  - ii. Find the colours of boats reserved by lubber?
  - iii. Find the names of sailors who reserved all boats called Interlake?
4. (a) Define the following terms with respect to the tuple calculus: tuple variable, range relation,atom, formula,and expression. [7M]
- (b) Create the following tables with the mapping given below: [7M]
  - i. Emp\_details (emp\_no, emp\_name ,DOB, address,doj, mobile\_no, dept\_no, salary)
  - ii. Dept\_details(dept\_no, dept\_name ,Location)
  - iii. Display the structure of details emp\_details
  - iv. Count maximum number of employees in department.
  - v. Truncate the table dept\_details.
  - vi Display emp\_name getting highest salary.

### UNIT – III

5. (a) List the data types that are allowed for SQL attributes? [7M]  
(b) Write appropriate SQL DDL statements for declaring the LIBRARY relational database schema of following and specify the keys and referential triggered actions. [7M]  
BOOK ( Book\_id, Branch\_id, No\_of\_copies)  
BOOK\_AUTHORS(Book\_id, Author\_name)  
LIBRARY\_BRANCH( Branch\_id, Branch\_name, Address)  
PUBLISHER( Name, Address, Phone)  
BOOK\_LOANS (Book\_id,Branch\_id,Card\_no,Date\_out,Due\_date)  
BORROWER(Card\_no, Name, Add)
6. (a) Given the database schema R(a, b, c), and a relation r on the schema R, write an SQL query to test whether the functional dependency  $b \rightarrow c$  holds on relation r. Also write an SQL assertion that enforces the functional dependency. Assume that no null values are present. [7M]  
(b) A functional dependency  $\alpha \rightarrow \beta$  is called a partial dependency if there is a proper subset  $\gamma$  of  $\alpha$  such that  $\gamma \rightarrow \beta$ . We say that  $\beta$  is partially dependent on  $\alpha$ . A relation schema R is in second normal form (2NF) if each attribute A in R meets one of the following criteria: [7M]
- It appears in a candidate key.
  - It is not partially dependent on a candidate key.
- Show that every 3NF schema is in 2NF.

### UNIT – IV

7. (a) Define Deadlock. Explain in detail the Deadlock Detection and Prevention. [7M]  
(b) Show by example that there are schedules possible under the tree protocol that are not possible under the two-phase locking protocol, and vice versa. [7M]
8. (a) Explain in detail the types of Concurrency Control Protocols. [7M]  
(b) Compare the deferred- and immediate-modification versions of the log-based recovery scheme in terms of ease of implementation and overhead cost. [7M]

### UNIT – V

9. (a) Explain in detail about the Heap file organization with an example. [7M]  
(b) Since indices speed up query processing, why might they not be kept on several search keys? List as many reasons as possible. [7M]
10. (a) Define the following terms: disk, disk pack, track, block, cylinder, sector, interblock gap, read/write head. [7M]  
(b) Write an algorithm for Searching for a record with search key field value K, using a B+-tree. [7M]

