BIT 1201: Database Systems CAT

DATE: 17th June 2019	**TIME Frame : 2 weeks(Open 17-Close 28th June)**

INSTRUCTIONS: *Attempt **all questions***

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Question 1 (30 Marks)

a) Define the following terms as used in databases: **(5 Marks)**

   i.   Database - An organized collection of data that can be easily accessed, manipulated and updated. A database is used by an organization as a method of storing, managing and retrieving information.

   ii.   Database management system   - A well organized filing software that is used to build maintain and control data that is stored in a database system.

   iii.   An Attribute and a tuple - a tuple is a table row in a database system. Each column (attribute) contains describing characteristics of the rows. A database attribute is a column name and the content of the fields under it in a table in a database.

   iv.   Data independence - Its the physical and logical independence of data that allows for schemes to be changed without affecting the existing schemes. But in physical structures, it involves separating data storage to ensure complete separation between different data sets/storage.

   v.   Views - A Database View is a subset of the database sorted and displayed in a particular way. For example, in an equipment database, perhaps you only wish to display the Weapons stored in the database.

b) List the **TWO** major components of SQL and state the function of each.   **(2 Marks)**

- **DDL -** Data Definition Language - In SQL these are commands that are used in creating and altering the structure of a database.

- **DML -** Data Manipulation Language - This is the user-readable language that is used to manipulate the contents of the database. These are commands like adding, deleting etc.

a) Use the table below to answer the questions that follow:

EMPLOYEE									
EMPLOYEE_ID	LAST_NAME	FIRST_NAME	MIDDLE_NAME	JOB_ID	MANAGER_ID	HIRE_DATE	SALARY	COMMISSION	DEPARTMENT_ID
7369	SMTIH	JOHN	Q	667	7902	17-DEC-84	800	NULL	20
7499	ALLEN	KEVIN	J	670	7698	20-FEB-85	1600	300	30
7505	DOYLE	JEAN	K	671	7939	04-APR-85	2850	NULL	30
7506	DENNIS	LYNN	S	671	7939	15-MAY-85	2750	NULL	30
7507	BAKER	LESLIE	D	671	7939	10-JUN-85	2200	NULL	40
7521	WARK	CYNTHIA	D	670	7698	22-FEB-85	1200	500	30

Write **SQL statements** for the following questions:

i. List out the employees who are earning salary between 3000 and 4500. **(2 marks)**
   SELECT *
   FROM EMPLOYEE
   WHERE SALARY BETWEEN 3000 AND 4500

ii. List out the employees whose name length is 4 and start with "S" **(2 marks)**
   SELECT LAST_NAME, FIRST_NAME, MIDDLE_NAME
   FROM EMPLOYEE
   WHERE length LAST_NAME, FIRST_NAME, MIDDLE_NAME)=4
   AND LIKE "%S";

iii. List out the employee details according to their last_name in ascending order and salaries in descending order **(3 marks)**
   SELECT LAST_NAME, SALARY

FROM EMPLOYEE
ORDER BY LAST_NAME asc , SALARY desc

iv. List out the job wise maximum salary, minimum salary, and average salaries of the employees.
SELECT JOB_ID, AVG(SALARY)
FROM EMPLOYEE
WHERE Max(SALARY), Min(SALARY)
GROUP BY JOB_ID

(2 marks)

v. Update the employees' salaries, who are working as Clerk on the basis of 10%.

(2 marks)

UPDATE SALARY(CLERK)
SET SALARY = SALARY * 0.01
WHERE SALARY = CLERK

Describe the purpose of normalizing data and the concept of functional dependency **(2 Marks)**

There are two purposes of the normalization process: eliminating redundant data (for example, storing the same data in more than one table) and ensuring data dependencies make sense (only storing related data in a table). Both of these are worthy goals, as they reduce the amount of space a database consumes and ensure that data is logically stored. Functional dependency in a database is a relationship between attributes of a table dependent on each other.

b) Explain the term Database normalization and normalize this data up to third normal form, showing each form and the various types of dependencies identified. **(10 Marks)**

Database Normalization is simply the process of efficiently organizing data in a database. Database normalization is done in accordance with a series of so-called normal forms in order to reduce data redundancy and improve data integrity.

PROJECT NUMBER	PROJECT NAME	EMPLOYEE NUMBER	JOB CLASS	CHARGE PER HOUR	HOURS
22231	CABLING	001	ENGINEER	4500	13
23227	CODING	090	ANALYST	5600	10
22233	DB DESIGN	002	CODER	6000	15

1NF -Identify and separate repeating groups to form a new entity

- PROJECT(<u>Project Number</u>, Project Name)
- EMPLOYEE(<u>Employee Number</u>, Job Class)

2NF - Identify and separate non key attributes not fully dependent on key attribute
- PROJECT(<u>Project Number</u>, Project Name)
- EMPLOYEE(<u>Employee Number</u>)
- CHARGES(Charge Per Hour, Hours)