BACHELOR OF ENGINEERING IN PRINTING ENGINEERING
EXAMINATION, 2022
(3rd Year, 2nd Semester)

DATABASE MANAGEMENT SYSTEM

Time: 3 Hour   Full Marks: 100

Section – A (Any _One_)   1 x 10 = 10

1. i) Sort the below mentioned list of number in descending order using **heap sort** (step wise) 12, 11, 7, 3, 10, -5, 0, 9, 2
    ii) **Radix Sort** the following list of number in increasing order (step wise): 189,205,986,421,97,192,535,839,562,674
    iii) What are the differences between linear and non-linear data structures?   4+4+2

2. i) What is the primary criterion of performing binary search technique on a list of data?
    ii) Sort the below mentioned list of number in increasing order using **merge sort** (step wise) 100,90,80,70,60,50,40,30,20
    iii) Write the difference between **stack and queue**. Explain with proper diagram.
    iv) "balance factor" is associated with which type of tree? What are the properties of it.
                                                                    2+4+2+2

Section – B (Any _One_)   1 x 20 = 20

1. i) Why would choose a database system instead of simply storing data in operating system files? When would it make sense not to use a database system?
    ii) What are the basic properties of NoSQL Database, explain different types of it and also explain the advantages over relational database?
    iii) Explain Data, Database and Database Management System?
    iv) Explain tuple and attribute in Database Management System.
    v) What are the different types of integrity constraint, explain with example.
    vi) Explain physical data independence & logical data independence.
                                                                    (2+2)+(2+2)+3+2+3+(2+2)

2. i) Explain the distinction among the terms primary key, candidates key and super key.
    ii) Write down the difference between DBMS vs RDBMS.
    iii) What do you mean by Relational Integrity Constraint?
    iv) Explains the functions of query in Database Management System.
    v) In which database data store as key-value pair? Write down the advantages of this database.
    vi) Explain Integrity independence & distribution independence.
    vii) Describe three tier client server architecture. Why do we need mapping between schema levels?   3+3+2+2+3+(2+2)+3

Section – C (Any _One_)   1 x 20 = 20

1. i) Reduction of E-R diagram into tables – Explain with proper diagram.
    ii) Draw ER diagram showing cardinality:
    - A bill is sent to a customer. A customer may receive may receive many bills.
    - A clerk works in a bank. A bank has many clerks.
    - Students appear for seats in college. Each student can get almost one seat. A college has many seats. A student can sent many applications.
    iii) Construct an ER diagram for a **car insurance company** whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. (You can add extra features with these.)
    iv) Explain the difference between single vs multivalued and stored vs derived with proper example and representation diagram.

v) "Each entity in the entity set may or may not participate in the relationship instance in relationship set" – which type of relationship is this? Explain with proper diagram.

4+3+6+4+3

2. i) What do you mean by relationship among entities? What are the different degree of relationship, explain with representation diagram.

ii) Some of the entries relevant to a technical university are given bellow:
For each of them, indicate the type of relationship existing among them (for example, one-to-one, one-to-many or many to many). Draw a relationship diagram for each of them.

- STUDENT and ENGG-BRANCH (students register for engineering branches)
- BOOK and BOOK-COPY (books have copies)
- ENGG-BRANCH and SECTION (branches have section)
- SECTION and CLASS-ROOM (sections are scheduled in classrooms)
- FACULTY and ENGG-BRANCH (faculty teaches in a particular branch)

iii) Explains the differences between Cardinality Constraint and Participation constraint.

iv) From the following information identify the entities, relationships and draw the E-R diagram.
A large university has a number of colleges in its jurisdiction. Each college has students and teachers. Teachers have certain qualifications and may have taught in other colleges. Some teachers have joint appointments and can teach in more than one college, however a student can attend only one college.

v) Explain the difference between simple vs composite, weak vs strong entity

(1+2)+5+3+5+4

Section – D (Any *One*)   1 x 20 = 20

1. i) What are the advantages of normalized relations over the unnormalized relations?

ii) Define BCNF. How does BCNF differ from 3NF? Explain with an example.

iii) What do you mean by "functional dependency"? What are the different types of it? Explain with example.

iv) What do you mean by anomalies? What are the different types of it?

v) The relation schema **Student_Performance** (name, courseNo, rollNo, grade) has the following FDs:
name,courseNo->grade
rollNo,courseNo->grade
name->rollNo
rollNo->name
What is the highest normal form of this relation schema?

2+3+8+2+5

2. i) Discuss the "insertion anomalies", "update anomalies", and "deletion anomalies" with respect to normal forms with suitable example and suggest a method to overcome them.

ii) Explain trivial functional dependency and transitive dependencies with example.

iii) Consider the relation -
assignment {worker_id, building_id, startdate, name, skilltype} and
Functional Dependencies are {worker_id -> name, (worker_id, building_id) ->startdate}. Is the relation in 2NF? If not, then make it in 2NF.If yes why it is in 2NF.

iv) Define MVD (Multivalued Dependency) with suitable example.

v) Please go through this table.

branchNo	branchAddress	telNos
B001	8 Jefferson Way, Portland, OR 97201	503-555-3618, 503-555-2727, 503-555-6534
B002	City Center Plaza, Seattle, WA 98122	206-555-6756, 206-555-8836
B003	14 – 8th Avenue, New York, NY 10012	212-371-3000
B004	16 – 14th Avenue, Seattle, WA 98125	206-555-3131, 206-555-4112

Is this table is in 1NF? If not, then make it in 1NF. If yes why it is in 1NF.

6+4+4+3+3

1. i) What is trigger? What are the different type of it, explain. MySQL supports which trigger?

    ii) Explain the term view. Explain with example.

    iii) Consider the following tables and write queries in SQL:

    Orders(order-no, order-date, unit)

    Order-details(order-no, order-item, quantity, delivery, price-unit, price)

    - Create the Order-details table with order-no of Order-details as foreign key of Orders-table.
    - List order-no, unit, order-item whose delivery is before year 2006.

    iv) Consider the following tables and write queries in SQL:

    Material-Master(item-id, item-name, reorder-level)

    Material-Ots (item-id, Supplier-id, Purchase-date, Qty, Utcost)

    - Select the quantities of each purchased material alphabetically
    - Select the names of materials which have the highest total quantity
    - Replace the material name "power supply" with "UPS"

    v) If you want to delete all rows at a time without delete the table structure, in between DROP, DELETE & TRUNCATE which one you choose and why? Explain with example.

    (1+2+1)+(1+2)+(2+2)+(2+2+2)+3

2. i) What is the difference between a database and a table?

    ii) List two reasons why 'null' values might be introduced into the database?

    iii) Consider the following employee database:

    Employee (employee-name, street, city)

    Works (employee-name, company-name, salary)

    Company (company-name, city)

    Manages (employee-name, manager-name)

    Write SQL's for the queries given below:

    - Find the names of all employee who work for XYZ company.
    - Find all employees in the database who live in the same cities as the companies for which they work.
    - Find all employees in the database who live in the same cities and on the same streets as do their managers.
    - Find all employees who earn more than the average salary of all employees of their company.
    - Find the company that has the smallest payroll.

    iv) Assume the following table:

    ENGINEERS (eng_id, eng_name, location).

    CUSTOMERS (cust_id, cust_name, location, eng_id)

    CONTRACT (cont_id, cont_amt, cont_date, cust_id, eng_id)

    Write SQL statement for the following:

    - To list contract received by all engineers who are not in the same location as the customers.
    - To select highest contract amount in each location.

    v) Difference between 'Modify' and 'Change', SQL command. Explain with example.

    2+2+(2+2+2+2+2)+(2+2)+2

1. I) Describe transaction with example. Explain the properties and life cycle of transaction.

    ii) Explain commit and rollback operations used in database management system.

    (2+5)+3

2. I) Discuss the ACID properties of a database transaction with proper example.

    ii) Explain the differences between failed and aborted in life cycle of transaction.

    6+4