M.Sc. (Computer Application) Sem-I University Practical Examination, October/November-2023
SUBJECT: CA 504 MJP-Lab course Based on CA 501 MJ & CA 503 MJ
(Database Systems and SQL & Operating Systems)

Time: 3 Hours   **Max. Marks: 35**

Note: -   1. Read the questions carefully and insert data in the database accordingly.

          2. Insert sufficient number of records in the database.

          3. Count queries output should be more than 2 records. (If asked)

          4. No query should generate empty output.

Q.1) Create the following database in 3NF using PostgreSQL.   **[10M]**

Consider the following Bank database which maintains information about its branches, customers and their loan applications.

      Branch (Bid integer, brname varchar (30), brcity varchar (10))

      Customer (Cno integer, cname varchar (20), caddr varchar (35), city varchar (15))

      Loan_application (Lno integer,l_amt_required money,lamtapproved money, l_date date)

Relationship:

Branch, Customer, Loan_application are related with ternary relationship as follows:

      Ternary (Bid integer, Cno integer, Lno integer)

Constraints: Primary key, l_amt_required should be greater than zero.

Draw ER diagram and Normalization diagram for above relational schema.

Using above database solve the following questions.

A. Create a View   **[4M]**

    1. To display names of customers for the 'Pune' branch.

    2. To display names of customers who have taken loan from the branch in the same city they live.

B. Write a stored function to count number of customers of particular branch. (Accept branch name as an input parameter).   **[6M]**

Q.2) Write code to simulate a simple FCFS scheduling algorithm for a set of processes. Calculate the waiting time and turnaround time for each process.   **[10M]**

Q.3) Viva   **[5M]**

Time: 3 Hours   Max. Marks: 35

Note: -   1. Read the questions carefully and insert data in the database accordingly.

2. Insert sufficient number of records in the database.

3. Count queries output should be more than 2 records. (If asked)

4. No query should generate empty output.

Q.1) Create the following database in 3NF using PostgreSQL.   **[10M]**
Consider the following Bank database which maintains information about its branches, customers and their loan applications.

Branch (<u>Bid</u> integer, brname varchar (30), brcity varchar (10))

Customer (<u>Cno</u> integer, cname varchar (20), caddr varchar (35), city varchar (15))

Loan_application (<u>Lno</u> integer,l_amt_required money, lamtapproved money,l_date date)

Relationship:
Branch, Customer, Loan_application are related with ternary relationship as follows:

Ternary (<u>Bid</u> integer, <u>Cno</u> integer, <u>Lno</u> integer)

Constraints: Primary key, l_amt_required should be greater than zero.
Draw ER diagram and Normalization diagram for above relational schema.

Using above database solve the following questions.

  A. Create a View   **[4M]**
   1. To display customer details who have applied for a loan of Rs. 3,00,000
   2. To display loan details from the 'Aundh' branch.

  B. Write a trigger to validate the loan amount approved. It must be less than or equal to loan amount required. Display appropriate message.   **[6M]**

Q.2) Implement functions to calculate turnaround time and waiting time for each process using the FCFS Scheduling algorithm.   **[10M]**

Q.3) Viva   [5M]

Time: 3 Hours   Max. Marks: 35

Note: -   1. Read the questions carefully and insert data in the database accordingly.

2. Insert sufficient number of records in the database.

3. Count queries output should be more than 2 records. (If asked)

4. No query should generate empty output.

Q.1) Create the following database in 3NF using PostgresSQL. **[10M]**
Consider the following database of Bus-Transport System. Many buses run on one route. Drivers are allotted to buses shift-wise.

Bus   (<u>Bus_no</u> int , capacity int , depot_name varchar (20))

Route   (<u>Route_no</u> int, source varchar (20), destination varchar (20), no_of_stations int)

Driver (<u>Driver_no</u> int, driver_name varchar (20), license_no int, address varchar (20), age int , salary float)

Relationship:
Bus and Route related with many to one relationship.
Bus and Driver related with many to many relationship with descriptive attributes, Shift – it can be 1 (Morning) or 2 (Evening) and Date_of_duty_allotted.

Constraints: Primary key, License_no must be unique, Bus capacity should not be null.
Draw ER diagram and Normalization diagram for above relational schema.

Using above database solve the following questions.
   A. Create a View   **[4M]**
   1. To display driver details working in Morning shift.
   2. To display driver details having salary > 20,000.

   B. Write a trigger before inserting the driver record in driver table, if the age is not between 21 and 30, then display error message 'Invalid Age'.   **[6M]**

Q.2) Write code to implement the SJF scheduling algorithm preemptive. Calculate waiting times and turnaround times for processes.   **[10M]**

Q.3) Viva   **[5M]**

Time: 3 Hours   Max. Marks: 35

Note: -   1. Read the questions carefully and insert data in the database accordingly.

2. Insert sufficient number of records in the database.

3. Count queries output should be more than 2 records. (If asked)

4. No query should generate empty output.

Q.1) Create the following database in 3NF using PostgresSQL.   **[10M]**
Consider the following database of Bus-Transport System. Many buses run on one route. Drivers are allotted to the buses shift-wise.

      Bus   (Bus_no int , capacity int , depot_name varchar(20))

      Route   (Route_no int, source varchar(20), destination varchar (20), no_of_stations int)

      Driver (Driver_no int , driver_name varchar(20), license_no int, address varchar (20), age int , salary float)

Relationship:

Bus and Route related with many to one relationship.

Bus and Driver related with many to many relationship with descriptive attributes, Shift – it can be 1 (Morning) or 2 (Evening) and Date_of_duty_allotted.

Constraints: Primary key, License_no must be unique, Bus capacity should not be null.

Draw ER diagram and Normalization diagram for above relational schema.

Using above database solve the following questions.

   A. Create a View   **[4M]**

1. To display details of Bus_no 102 along with details of all drivers who have driven that bus.

2. To display the route details on which buses of capacity 30 runs.

   B. Write a stored function to accept the bus_no and date and print its allotted drivers. Raise an exception in case of invalid bus number.   **[6M]**

Q.2) Write a simulation program to implement a Non-Pre-emptive Shortest Job First (SJF) – CPU scheduling algorithm. Accept the number of Processes and arrival time and CPU burst time for each process as input. The output should give the Gantt chart, turnaround time and waiting time for each process. Also display the average turnaround time and average waiting time. **[10M]**

Q.3) Viva   **[5M]**

M.Sc. (Computer Application) Sem-I University Practical Examination, October/November-2023
SUBJECT: CA 504 MJP-Lab course Based on CA 501 MJ & CA 503 MJ
(Database Systems and SQL & Operating Systems)

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Note: -   1. Read the questions carefully and insert data in the database accordingly.
              2. Insert sufficient number of records in the database.
              3. Count queries output should be more than 2 records. (If asked)
              4. No query should generate empty output.

Q.1) Create the following database in 3NF using PostgresSQL.   **[10M]**
Consider the following Project-Employee database, which is managed by a company and stores the details of projects assigned to employees.
        Project (Pno int, pname varchar (30), ptype varchar (20), duration integer)
        Employee (Eno integer, ename varchar (20), qualification char (15), joining_date date)

Relationship:
Project-Employee related with many-to-many relationship, with descriptive attributes as start_date_of_Project, no_of_hours_worked.

Constraints: Primary key, pname should not be null.
Draw ER diagram and Normalization diagram for above relational schema.

Using above database solve the following questions.
   A. Create a View   **[4M]**
   1. To display the project name, project type, and project start date, sorted by project start date.
   2. To display the name and qualification of the employee, sorted by the employee name.

   B. Write a trigger before inserting joining date into employee table, check joining date should be always greater than current date. Display appropriate message.
       [6M]

Q.2) Write code for a Round Robin scheduling algorithm, and simulate its execution for a set of processes with different time slices. Calculate waiting times and turnaround times.   **[10M]**

Q.3) Viva   **[5M]**

M.Sc. (Computer Application) Sem-I University Practical Examination, October/November-2023
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(Database Systems and SQL & Operating Systems)

Time: 3 Hours   **Max. Marks: 35**

Note: -   1. Read the questions carefully and insert data in the database accordingly.
          2. Insert sufficient number of records in the database.
          3. Count queries output should be more than 2 records. (If asked)
          4. No query should generate empty output.

Q.1) Create the following database in 3NF using PostgresSQL.   **[10M]**
Consider the following Project-Employee database, which is managed by a company and stores the details of projects assigned to employees.

      Project (Pno int, pname varchar (30), ptype varchar (20), duration integer)
      Employee (Eno integer, ename varchar (20), qualification char (15), joining_date date)

Relationship:
Project-Employee related with many-to-many relationship, with descriptive attributes as start_date_of_Project, no_of_hours_worked.

Constraints: Primary key, pname should not be null.
Draw ER diagram and Normalization diagram for above relational schema.

Using above database solve the following questions.
  A. Create a View   **[4M]**
  1. To display employee details and it should be sorted by employee's joining date.
  2. To display project details sorted by project type.

  B. Write function using cursor to accept project name as input and display names of employee's working on that project.   **[6M]**

Q.2) Implement a priority scheduling algorithm. Assign priorities to processes and write code to schedule them accordingly.   **[10M]**

Q.3) Viva   **[5M]**

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Time: 3 Hours   **Max. Marks: 35**

Note: -   1. Read the questions carefully and insert data in the database accordingly.

2. Insert sufficient number of records in the database.

3. Count queries output should be more than 2 records. (If asked)

4. No query should generate empty output.

Q.1) Create the following database in 3NF using PostgresSQL.   **[10M]**

Consider the following Student-Teacher database maintained by a college. It also gives information of the subject taught by teachers.

Student (Sno integer, sname varchar (20), sclass varchar (10), saddr varchar(30))

Teacher (Tno integer, tname varchar (20), qualification char (15), experience integer)

Relationship: Student-Teacher related with many to many relationship with descriptive attribute Subject.

Constraints: Primary Key, student and teacher name should not be null.
Draw ER diagram and Normalization diagram for above relational schema.

Using above database solve the following questions.
A. Create a View   **[4M]**
1. To display student names who are taught by most experienced teacher.
2. To display subjects taught by each teacher.

B. Write a trigger before update a student's class from student table. Display appropriate message**.**   **[6M]**

Q.2) Design and implement a multilevel queue scheduler with different priority levels. Write code to assign and schedule processes in different queues.   **[10M]**

Q.3) Viva   **[5M]**

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Note: -   1. Read the questions carefully and insert data in the database accordingly.

2. Insert sufficient number of records in the database.

3. Count queries output should be more than 2 records. (If asked)

4. No query should generate empty output.

Q.1) Create the following database in 3NF using PostgresSQL.   **[10M]**

Consider the following Student-Teacher database maintained by a college. It also gives information of the subject taught by the teachers.

Student (Sno integer, sname varchar (20), sclass varchar (10), saddr varchar (30))
Teacher (Tno integer, tname varchar (20), qualification char (15), experience integer)

Relationship:
Student-Teacher related with many to many relationship with descriptive attribute Subject

Constraints: Primary Key, student and teacher name should not be null.
Draw ER diagram and Normalization diagram for above relational schema.

   Using above database solve the following questions.
  A. Create a View   **[4M]**
  1. To display details of teachers having experience > 5 years.
  2. To display details of teachers whose name start with the letter 'S'.

   B. Write a function to count the number of the teachers who are teaching to a student named
'_____'. (Accept student name as input parameter).   **[6M]**

Q.2) Write a Program to accept a set of processes and their burst times, calculate the average waiting time and turnaround time for different scheduling algorithms, such as FCFS, SJF, and Round Robin.   [**10M**]

Q.3) Viva   **[5M]**

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Note: -   1. Read the questions carefully and insert data in the database accordingly.

2. Insert sufficient number of records in the database.

3. Count queries output should be more than 2 records. (If asked)

4. No query should generate empty output.

Q.1) Create the following database in 3NF using PostgreSQL.   **[10M]**
Consider the following Student –Marks database

Student (Rollno integer, sname varchar(30), address varchar(50), class varchar(10))
Subject (Scode varchar(10), subject_name varchar(20))

Relationship:
Student-Subject related with many-to-many relationship with attributes marks_scored.

Constraints: Primary key, sname should not be null.
Draw ER diagram and Normalization diagram for above relational schema.

Using above database solve the following questions.
A. Create a View   **[4M]**
1. To display student names of class 'FYMScCA'.
2. To display students name, subject and marks who scored more than 90 marks.

B. Write a function using cursor, to calculate total marks of each student and display it.   **[6M]**

Q.2) Write a C Program to represent a Resource Allocation Graph using appropriate data structures for nodes and edges.   **[10M]**

Q.3) Viva   **[5M]**

Time: 3 Hours   **Max. Marks: 35**

Note: -   1. Read the questions carefully and insert data in the database accordingly.

           2. Insert sufficient number of records in the database.

           3. Count queries output should be more than 2 records. (If asked)

           4. No query should generate empty output.

Q.1) Create the following database in 3NF using PostgreSQL.   **[10M]**
Consider the following Student –Marks database

Student (Rollno integer, sname varchar (30), address varchar (50), class varchar (10))
Subject (Scode varchar (10), subject_name varchar (20))

Relationship:
Student-Subject related with many-to-many relationship with attributes marks_scored.

Constraints: Primary key, sname should not be null.
Draw ER diagram and Normalization diagram for above relational schema.

Using above database solve the following questions.
   A. Create a View   **[4M]**
   1. To display details of students whose name starts with the letter 'A'.
   2. To display student names, subject and marks who scored less than 40 marks.

   B. Write a trigger to ensure that the marks entered for a student, with respect to a subject is
      never < 0 and greater than 100.   **[6M]**

Q.2) Write a function to add a request edge between a process and a resource in the graph.
                                                                                          [10M]

Q.3) Viva   **[5M]**

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2. Insert sufficient number of records in the database.

3. Count queries output should be more than 2 records. (If asked)

4. No query should generate empty output.

Q.1) Create the following database in 3NF using PostgreSQL.   [10M]

Consider the following database of Movie_Actor_Producer .

Movie (m_name varchar (25), release_year integer, budget money)

Actor (a_name char (30), role char (30), city varchar (30))

Producer (producer_id integer, pname char (30), p_address varchar (30))

Relationship:

Movie and Actor related with many-to-many relationship with descriptive attribute charges.

Producer and Movie related with many-to-many relationship.

Constraints: Primary key, release_year should not be null.

Draw ER diagram and Normalization diagram for above relational schema.

Using above database solve the following questions.

A. Create a View   [4M]
1. To display actor names who lives in 'Mumbai'.
2. To display the actors in each movie.

B. Write a trigger before inserting budget into a movie table. Budget should be minimum 50 lakh. Display appropriate message.   **[6M]**

Q.2) Write a C program that implements the Banker's Algorithm for resource allocation and deadlock avoidance. The program should take the following inputs:
   a) The number of processes.
   b) The number of resources.
   c) The maximum demand matrix (maximum resources each process can claim).
   d) The allocation matrix (resources currently allocated to each process).
   e) The available resources vector.

                                                                                          [10M]

Q.3) Viva   [5M]

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2. Insert sufficient number of records in the database.
3. Count queries output should be more than 2 records. (If asked)
4. No query should generate empty output.

Q.1) Create the following database in 3NF using PostgreSQL.   **[10M]**
Consider the following database of Movie_Actor_Producer .
        Movie (m_name varchar (25), release_year integer, budget money)
        Actor (a_name char (30), role char (30), city varchar (30))
        Producer (producer_id integer, pname char (30), p_address varchar (30))

Relationships:

Movie and Actor related with many-to-many relationship with descriptive attribute charges.

Producer and Movie related with many-to-many relationship.

Constraints: Primary key, release_year should not be null.
Draw ER diagram and Normalization diagram for above relational schema.

Using above database solve the following questions.
A. Create a View   **[4M]**
   1. To display movie names produced by 'Mr. Subhash Ghai'.
   2. To display actor names who do not live in Mumbai or Pune city.

B. Write a function to list movie-wise charges of 'Amitabh Bachchan'.   **[6M]**

Q.2) Write a function to add a request edge between a process and a resource in the graph.
                                                                                                             [10M]

Q.3) Viva   **[5M]**

Time: 3 Hours   **Max. Marks: 35**

Note: -   1. Read the questions carefully and insert data in the database accordingly.

2. Insert sufficient number of records in the database.

3. Count queries output should be more than 2 records. (If asked)

4. No query should generate empty output.

Q.1) Create the following database in 3NF using PostgreSQL.   **[10M]**

Consider the following Person–Area database

Person (pnumber integer, pname varchar (20), birthdate date, income money)

Area (aname varchar (20), area_type varchar (5))

An area can have one or more persons living in it, but a person belongs to exactly one area. The attribute 'area_type' can have values either 'urban' or 'rural'. Create the above database in PostgreSQL.

Draw ER diagram and Normalization diagram for above relational schema.

Using above database solve the following questions.

A. Create view   **[4M]**

1. List the names of all people living in '_____' area.

2. Display person details sorted by person name.

B. Write a cursor to update the income of all people living in 'Urban' area by 10%.

Q.2) Write a C Program to represent a Resource Allocation Graph using appropriate data structures for nodes and edges.   **[10M]**

Q.3) Viva   **[5M]**

Time: 3 Hours   Max. Marks: 35

Note: -   1. Read the questions carefully and insert data in the database accordingly.

2. Insert sufficient number of records in the database.

3. Count queries output should be more than 2 records. (If asked)

4. No query should generate empty output.

Q.1) Create the following database in 3NF using PostgreSQL.   **[10M]**

Consider the following Person–Area database

Person (pnumber integer, pname varchar (20), birthdate date, income money)

Area (aname varchar (20), area_type varchar (5))

An area can have one or more persons living in it, but a person belongs to exactly one area. The attribute 'area_type' can have values either 'urban' or 'rural'. Create the above database in PostgreSQL.

Draw ER diagram and Normalization diagram for above relational schema.

Using above database solve the following questions.

A. Create view   **[4M]**

1. To display details of all the peoples Whose birthday falls in the month of_____.

2. List names of people according to area_type having minimum income.

B. Write a function to print total number of persons of a particular area. (Accept area_name as input parameter). Display appropriate message.   **[6M]**

Q.2) Implement the Banker's Algorithm to determine if the system is in a safe state or not.

[10M]

Q.3) Viva   **[5M]**

Time: 3 Hours   Max. Marks: 35

Q.1) Create the following database in 3NF using PostgreSQL.   **[10M]**
Consider the following database maintained by a school about students and competitions.
STUDENT (sreg_no int , name char(30), class char(10))
COMPETITION (c_no int , name char(20), C_type char(15))
The relationship is as follows:
STUDENT-COMPETITION: M-M with described attributes rank and year.
Draw ER diagram and Normalization diagram for above relational schema.

Using above database solve the following questions.
A. Create a view   **[4M]**
   1. To display details of competitions and it should be sorted on competition type.
   2. To display student name, class, competition name, rank and year. The list should be sorted by student name.

B. Define a trigger on the relationship table. If the year entered is greater than current year, it should be changed to current year.   **[6M]**

Q.2) Write a C program that implements the Banker's Algorithm for resource allocation and deadlock avoidance. The program should take the following inputs:
   a) The number of processes.
   b) The number of resources.
   c) The maximum demand matrix (maximum resources each process can claim).
   d) The allocation matrix (resources currently allocated to each process).
   e) The available resources vector.
                                                                                                                   [10M]

Q.3) Viva   **[5M]**