Operating Systems Lab
Mid-Exam

Total Marks: 25
Total Time: 1hr 30 min

Q1: Build a process tree for the following code and also state the output of the code. (5)

```
int main()
{

    if(fork() && fork() || fork() || fork())
    {


        if (fork() && !fork())
        {
            if(!fork())
            {
                cout<<"!"<<endl;
            }
        }
    }

    cout<<"Done"<<endl;
}
```

Q2: **Bank Account Management System using Named Pipes** **(15)**

Design a bank account management system using named pipes.The system should consist of a client-server relationship. The server should manage bank accounts and handle transactions initiated by clients.Client should be able to perform operations such as checking balance, depositing money, and withdrawing money. Balance will be 0 at the start.

Your task is to implement the following functionalities:

1. **Server Component:**
    - Create a server program that stops only when the client asks to exit.
    - Implement functions to perform operations such as checking balance, depositing money, and withdrawing money.
    - Track and display total transactions performed by all clients.

2. **Client Component:**
    - Implement a client program that connects to the server.
    - Allow the client to perform operations such as checking balance, depositing money, withdrawing money.
    - Display appropriate messages to the user based on the server's response.
    - Ensure error handling for scenarios such as insufficient balance, invalid account numbers, etc.
    - Give an exit command to the server when the user wants to exit.

Q3: Write a C/C++ code in which user is asked 3 options: (5)

1. To check if the number is prime or not
2. To calculate its factorial
3. To check whether the number is a perfect square or not.

You have to code all these options in different files. Use exec and fork.

Your implementation should be well-commented, modular, and easy to understand. You will use C/C++ language for coding