8. a) ROLE BASED ACCESS CONTROL SYSTEM

Code :

```
package Experiment8;
import java.util.*;
class User
{
	public String username;

	User(String name)
	{
		username = name;
	}
	public void accessSystem()
	{
		System.out.println("Access Denied: Insufficient permission");
	}
}
class Admin extends User
{
	Admin(String name)
	{
		super(name);
	}
	@Override
	public void accessSystem()
	{
		System.out.println(username+" : Admin access -> Access to everything");
	}
}
class Manager extends User
{
	Manager(String name)
	{
		super(name);
	}
	@Override
	public void accessSystem()
	{
		System.out.println(username+" : Manager access -> Access to management
resources granted");
	}
}

class Employee extends User
{
	Employee(String name)
	{
```

```
                super(name);
        }
        @Override
        public void accessSystem()
        {
                System.out.println(username+" : Employee access-> Access to general resources
granted");
        }
}

public class RoleBasedAccessControl {
        public static void main(String[] args) {
                String role;
                Scanner sc = new Scanner(System.in);
                String name;
                User u;

                System.out.print("Enter the name : ");
                name = sc.nextLine();
                System.out.println("Please select the role from the following : ");
                System.out.println("1. Admin\n2. Manager\n3. Employee\n4. Other\n");
                System.out.print("Provide your role : ");
                role = sc.nextLine();

                if(role.equalsIgnoreCase("admin"))
                        u = new Admin(name);
                else if(role.equalsIgnoreCase("manager"))
                        u = new Manager(name);
                else if(role.equalsIgnoreCase("employee"))
                        u = new Employee(name);
                else
                        u = new User(name);
                u.accessSystem();
        }
}
```

Output :

```
Enter the name : suresh
Please select the role from the following :
1. Admin
2. Manager
3. Employee
4. Other

Provide your role : admin
suresh : Admin access -> Access to everything
```

8. b) MULTI-FACTOR AUTHENTICATION SYSTEM

Code :

```
import java.util.Random;
import java.util.Scanner;
abstract class UserAuthentication {
   abstract boolean authenticate();
}
class PasswordLogin extends UserAuthentication {
   private final String storedUsername;
   private final String storedPassword;

   public PasswordLogin(String username, String password) {
      this.storedUsername = username;
      this.storedPassword = password;
      System.out.println("User registered with Username and Password.");
   }
   @Override
   public boolean authenticate() {
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter Username: ");
      String username = sc.nextLine();
      System.out.print("Enter Password: ");
      String password = sc.nextLine();

      if (storedUsername.equals(username) && storedPassword.equals(password)) {
         System.out.println(" Login Successful: Valid Username & Password");
         return true;
      } else {
         System.out.println(" Login Failed: Invalid Username or Password");
         return false;
      }
   }
}


class OTPLogin extends UserAuthentication {
   private final String email;
   private final String otp;

   public OTPLogin(String email) {
      this.email = email;
      this.otp = generateOTP();
      System.out.println("User registered with Email: " + this.email);
      System.out.println(" OTP sent: " + this.otp );
   }

   private String generateOTP() {
      Random rand = new Random();
```

```
        return String.format("%06d", rand.nextInt(1000000));
    }

    @Override
    public boolean authenticate() {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter OTP: ");
        String enteredOTP = sc.nextLine();

        if (this.otp.equals(enteredOTP)) {
            System.out.println(" Login Successful: Valid Email & OTP");
            return true;
        } else {
            System.out.println(" Login Failed: Invalid OTP");
            return false;
        }
    }
}

class BiometricLogin extends UserAuthentication {
    private final boolean isBiometricEnabled;

    public BiometricLogin(boolean isBiometricEnabled) {
        this.isBiometricEnabled = isBiometricEnabled;
        System.out.println("User registered with Biometric Authentication.");
    }

    public boolean authenticate() {
        if (isBiometricEnabled) {
            System.out.println(" Login Successful: Biometric Authentication Passed");
            return true;
        } else {
            System.out.println(" Login Failed: Biometric Authentication Failed");
            return false;
        }
    }
}

public class MultiFactorAuthenticationSystem {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int choice;

        System.out.println("---- User Authentication System ----");
        System.out.println("1. Login using Username & Password");
        System.out.println("2. Login using Email & OTP");
        System.out.println("3. Login using Biometric");
        System.out.print("Enter your choice: ");
```

```
        choice = sc.nextInt();
        sc.nextLine();
        UserAuthentication authMethod;

        switch (choice) {
            case 1:
                authMethod = new PasswordLogin("solai@123", "12345");
                authMethod.authenticate();
                break;

            case 2:
                System.out.print("Enter Email: ");
                String email = sc.nextLine();
                authMethod = new OTPLogin(email);
                authMethod.authenticate();
                break;

            case 3:
                authMethod = new BiometricLogin(true);
                authMethod.authenticate();
                break;

            default:
                System.out.println(" Invalid choice! Please select a valid authentication method.");
                break;
        }
        System.out.println("Exiting...");
    }
}
```

Output :

```
---- User Authentication System ----
1. Login using Username & Password
2. Login using Email & OTP
3. Login using Biometric
Enter your choice: 2
Enter Email: sample@gmail.com
User registered with Email: sample@gmail.com
 OTP sent: 945621
Enter OTP: 945621
 Login Successful: Valid Email & OTP
Exiting...
```