Assignment: "Basic Text Encoder and Decoder"

Objective:
Create a simple Java program to encode and decode text using a shift-based cipher (similar to a Caesar cipher). This will help you practice using loops, conditionals, and basic string manipulation in Java.

Assignment Requirements:

1. **Basic Functionality:**
   - **Encode a message:** Shift each letter in a user-provided message by a userdefined number (e.g., 'A' becomes 'C' with a shift of 2).
   - **Decode a message:** Reverse the shift to decode a previously encoded message.
   - The program should handle both uppercase and lowercase letters correctly.
   - Non-alphabetic characters (e.g., spaces, punctuation) should remain unchanged.
2. **User Interaction:**
   - Create a menu for the user to choose:
     - Encode a message.
     - Decode a message. Exit the program.
3. **Functionality Details:**
   - Wrap around letters at the end of the alphabet (e.g., shifting 'Z' forward by 2 results in 'B'). Validate user input to ensure correct operation.

Bonus Challenges (Optional):

- Allow the user to input multiple messages in one session.
- Provide an option to reset the shift number mid-session.

Instructions:

1. Write clean, modular code using methods for major functionalities (e.g., encoding, decoding, displaying the menu).
2. Add comments explaining your logic.
3. Test your program for various edge cases (e.g., wrapping around 'Z', handling spaces).
4. Submit your code in a `.pdf` file, including the output screenshots for demonstration.

Example Input and Output:

- **Input:** "Hello, World!" with a shift of 3.
- **Encoded Output:** "Khoor, Zruog!"
- **Decoded Output (shift 3):** "Hello, World!"

JAVA PROGRAM:

```
import java.util.Scanner;

public class TextEncoderDecoder {

    // Method to encode text

    public static String encode(String text, int shift) {

        StringBuilder encoded = new StringBuilder();

        for (char c : text.toCharArray()) {

            if (Character.isUpperCase(c)) {

                // Shift uppercase letters

                char shifted = (char) ('A' + (c - 'A' + shift) % 26);

                encoded.append(shifted);

            } else if (Character.isLowerCase(c)) {

                // Shift lowercase letters

                char shifted = (char) ('a' + (c - 'a' + shift) % 26);

                encoded.append(shifted);
```

```
        } else {
            // Non-alphabetic characters remain unchanged
            encoded.append(c);
        }
    }
    return encoded.toString();
}
// Method to decode text
public static String decode(String text, int shift) {
    // Decoding is just encoding with negative shift
    return encode(text, (26 - (shift % 26)) % 26);
}
// Method to display the menu
public static void displayMenu() {
    System.out.println("\n==== Text Encoder & Decoder ====");
    System.out.println("1. Encode a message");
    System.out.println("2. Decode a message");
    System.out.println("3. Exit");
    System.out.print("Choose an option: ");
}
public static void main(String[] args) {
    Scanner scanner = new Scanner(System.in);
    int choice;
    boolean running = true;
    while (running) {
```

```
displayMenu();
while (!scanner.hasNextInt()) {
    System.out.println("Invalid input. Please enter a number (1-3).");
    scanner.next();
}
choice = scanner.nextInt();
scanner.nextLine(); // Consume newline
  switch (choice) {
    case 1:
        System.out.print("Enter the message to encode: ");
        String messageToEncode = scanner.nextLine();
        System.out.print("Enter shift value: ");
        int shiftEncode = scanner.nextInt();
        scanner.nextLine(); // Consume newline
        String encoded = encode(messageToEncode, shiftEncode);
        System.out.println("Encoded Message: " + encoded);
        break;
    case 2:
        System.out.print("Enter the message to decode: ");
        String messageToDecode = scanner.nextLine();
        System.out.print("Enter shift value: ");
        int shiftDecode = scanner.nextInt();
        scanner.nextLine(); // Consume newline
        String decoded = decode(messageToDecode, shiftDecode);
        System.out.println("Decoded Message: " + decoded);
```

```
                break;
            case 3:
                System.out.println("Exiting program. Goodbye!");
                running = false;
                break;
            default:
                System.out.println("Invalid choice. Please select between 1-3.");
        }
    }
    scanner.close();
  }
}
```

OUTPUT