

# ***COMSATS University Islamabad***

## ***Attock Campus***



## ***Department Of Computer Science***

<b><i>Course:</i></b>	<b><i>Information Security</i></b>
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<b><i>L-Assignment No:</i></b>	<b><i>01</i></b>
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## Detailed Code

"""

*SIMPLE CAESAR CIPHER*

*This program shifts letters to encrypt messages*

*Example: "HELLO" with shift 3 becomes "KHOOR"*

"""

def caesar\_encrypt (text, shift):

"""

*STEP BY STEP:*

- 1. Take each letter from text*
- 2. If it's a letter, shift it*
- 3. If not a letter, keep it as is*
- 4. Return the new text*

"""

new\_text = ""

*# Look at each character one by one*

for character in text:

*# Check if it's a letter*

if character.isalpha():

*# Handle uppercase letters (A-Z)*

if character.isupper():

*# Convert letter to number (A=0, B=1, ... Z=25)*

*# ord('A') = 65, so subtract 65 to get 0-25*

old\_position = ord(character) - 65

*# Add shift to get new position*

new\_position = (old\_position + shift) % 26

```

        # Convert back to letter (add 65 to get ASCII code)

        new_character = chr(new_position + 65)

        # Handle lowercase letters (a-z)

    else:

        # Similar process but with 'a' = 97

        old_position = ord(character) - 97

        new_position = (old_position + shift) % 26

        new_character = chr(new_position + 97)

    # Add the new letter to our result

    new_text = new_text + new_character

else:

    # If it's not a letter (space, comma, etc.), keep it

    new_text = new_text + character

# Return the encrypted text

return new_text


def caesar_decrypt (ciphertext, shift):

    """

    To decrypt, just shift backwards

    (use negative shift)

    """

    return encrypt(text, -shift)


# =====

# Let's test the program

# =====

```

```

print("=" * 50)
print("SIMPLE CAESAR CIPHER")
print("=" * 50)

# Get message from user
user_message = input("\nEnter your message: ")

# Get shift from user
user_shift = int(input("Enter shift number (1-25): "))

# Make sure shift is within range
user_shift = user_shift % 26

# Encrypt the message
encrypted_message = encrypt(user_message, user_shift)

# Show results
print("\n" + "-" * 30)
print("RESULTS:")
print("-" * 30)
print(f"Original: {user_message}")
print(f"Encrypted: {encrypted_message}")

# Decrypt to verify
decrypted_message = decrypt(encrypted_message, user_shift)
print(f"Decrypted: {decrypted_message}")

# Check if it worked
if user_message == decrypted_message:
    print("\n✓ Success! The message was properly encrypted and decrypted.")
else:

```

```
print("\nX Something went wrong.")  
  
# Show example  
print("\n" + "-" * 30)  
print("HOW IT WORKS:")  
print("-" * 30)  
print("A → B → C → D ... (shift 1)")  
print("HELLO → KHOOR (shift 3)")  
print("Only letters change, spaces stay the same")
```

---

## Program Description:

This program implements the Caesar Cipher algorithm to encrypt and decrypt messages. The Caesar Cipher shifts letters by a fixed number in the alphabet.

*HELLO (shift 3) → KHOOR*

Function: `caesar_encrypt(text, shift)`

### Step#1

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```

### Step#3

```
26  
27     if character.isalpha():  
28
```

Checks if the character is a letter.

- If yes → shift it.
- If no → keep it unchanged.

### Step 4: Uppercase Handling

```
35  
36         old_position = ord(character) - 65  
37
```

Convert letter to number (A=0, B=1...).

### Step 5:

```
50  
51         new_position = (old_position + shift) % 26  
52
```

add shift and uses modulo 26 to wrap around alphabet.

### Step 6:

```
44  
45         new_character = chr(new_position + 65)  
46  
--
```

convert number back to letter

### Step 7:

If lowercase:

Same process but subtract 97 instead of 65

### Step 8:

```
61  
62     return new_text  
63 |
```

Returns encrypted message

## Decryption Function.

```
71  
72     return encrypt(text, -shift)  
73  
74
```

To decrypt, we shift backwards (negative shift).

---

## Security Analysis.

### Type of Cipher.

The Caesar Cipher is a **substitution cipher**

### Key Space.

Only 25 possible keys (1–25 shifts).

### Security Level

- Very weak.
- Can be broken using brute force easily.
- Vulnerable to frequency analysis.

### Why It Is Not Secure Today?

It was used before more than 1000-2000 years. Modern encryption algorithms like:

- Advanced Encryption Standard
- RSA



## OUTPUT:

```
<
Shell x
>>> %Run -c $EDITOR_CONTENT
=====
SIMPLE CAESAR CIPHER
=====

Enter your message: HELLO
Enter shift number (1-25): 3

-----
RESULTS:
-----
Original: HELLO
Encrypted: KHOOR
Decrypted: HELLO

✓ Success! The message was properly encrypted and decrypted.

-----
HOW IT WORKS:
-----
A → B → C → D ... (shift 1)
HELLO → KHOOR (shift 3)
Only letters change, spaces stay the same
>>> |
```