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**Cairo University**

**Faculty of Computers and Artificial Intelligence**

CS112: Structured Programming

Assignment 1

* **Submitted by:**

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**Cipher 1**

**Cipher 2**

**Cipher 3**

**Encryption Algorithm:**

Initialize Variables: Declare variables for the plaintext message, the encryption key, and the encrypted message.

Convert to Uppercase: Convert both the plaintext message and the key to uppercase for consistency.

Repeat Key: If the length of the key is shorter than the plaintext message, repeat the key to match the length of the plaintext message.

Encrypt Message:

Iterate through each character of the plaintext message.

If the character is alphabetic:

Calculate the shift value by subtracting 'A' from the sum of the corresponding plaintext character and key character (both converted to ASCII values).

Apply the modular operation (mod 26) to handle wraparound.

Convert the resulting value back to a character by adding 'A' to it.

Append the encrypted character to the encrypted message.

Return Encrypted Message.

Decryption Algorithm:

Initialize Variables: Declare variables for the encrypted message, the decryption key, and the decrypted message.

Convert to Uppercase: Convert both the encrypted message and the key to uppercase.

Repeat Key: If the length of the key is shorter than the encrypted message, repeat the key to match the length of the encrypted message.

**Decrypt Message:**

Iterate through each character of the encrypted message.

If the character is alphabetic:

Calculate the shift value by subtracting the key character (converted to ASCII) from the encrypted message character (also converted to ASCII).

Add 26 to handle negative values before taking the modulo 26.

Apply the modular operation (mod 26) to handle wraparound.

Convert the resulting value back to a character by adding 'A' to it.

Append the decrypted character to the decrypted message.

Return Decrypted Message.

**Cipher 4**

**Encryption (Baconian Cipher):**

Input: Message to be encrypted.

Convert Characters to Binary:

For each character in the message:

Subtract 1 from the character's ASCII value.

Convert the ASCII value to a 5-bit binary representation using bitset.

Append the binary representation to the ciphertext string.

Encode Binary Digits:

Replace each '0' with 'a' and each '1' with 'b'.

Output: Encrypted message.

**Decryption (Baconian Cipher):**

Input: Encrypted message.

Convert Characters to Binary:

For each character in the message:

If the character is 'a', replace it with '0'; if it's 'b', replace it with '1'.

Group Binary Digits:

Divide the binary string into groups of 5 bits.

Decode Binary Digits:

For each group of 5 bits:

Convert the binary representation to decimal.

Add 1 to the decimal value.

Convert the decimal value to ASCII character.

Append the decoded character to the plaintext string.

Output: Decrypted message.

**Cipher 5**

**Encryption (Simple Substitution Cipher):**

Input: Message to be encrypted, substitution key, and the alphabet.

Prepare Key: Create an array of size 26 to store the substituted alphabet.

Initialize it with the characters from the key.

Fill the remaining slots with the remaining alphabets in order.

Substitute Characters:

For each character in the message:

If the character is a space, leave it unchanged.

Otherwise, substitute it with the corresponding character from the key array.

Output: Encrypted message.

**Decryption (Simple Substitution Cipher):**

Input: Encrypted message, substitution key, and the alphabet.

Prepare Key: Create an array of size 26 to store the substituted alphabet.

Initialize it with the characters from the key.

Fill the remaining slots with the remaining alphabets in order.

Reverse Substitution:

For each character in the encrypted message:

If the character is a space, leave it unchanged.

Otherwise, find its index in the key array and substitute it with the corresponding alphabet.

Output: Decrypted message.

**Cipher 6**

**Cipher 7**

**Cipher 8**

**Cipher 9**

**Encryption:**

Remove Spaces: Remove any spaces from the message.

Divide the Message into Rails:

For each rail (row), iterate through the message characters, skipping characters based on a specific pattern determined by the key.

Append each character in the message to its corresponding rail.

Combine Rails: Concatenate the characters from each rail to form the encrypted message.

**Decryption:**

Initialize a Placeholder: Create an empty string with the same length as the encrypted message.

Divide the Encrypted Message into Rails:

For each rail (row), iterate through the encrypted message characters, again skipping characters based on the key pattern.

Place each character in the appropriate position in the placeholder string.

Read Off the Decrypted Message: Read the characters in the placeholder string from left to right to obtain the decrypted message.