ALGORITHM:

Part1: Encryption

Step 1: Construction of 10x10 substitution matrix:

The proposed method starts with a Playfair encryption technique by constructing a 10x10 substitution matrix. English alphabets (upper and lower case), space, numbers, and some special characters with punctuations are used for the substitution matrix.

i. A keyword is chosen.
ii. Characters of the keyword are entered in 10x10 substitution matrix, eliminating the duplicate characters.
iii. Remaining spaces of the substitution matrix is filled with rest of the characters.

Step 2: Encryption Process: The message is encrypted into medialcipher text by using the 10x10 substitution matrix.

i. Message is broken into a group of two characters.
ii. Filler character 'æ' (Latin: dipthong) is added, after the first character when both the characters are same, or only one character is left.
iii. Rules used to encrypt the pairs of characters of message using substitution matrix, is same as the Classical Playfair Cipher.

Step 3: DNA Encoding: Medialcipher text is encoded into a *DNA sequence*. (A for 00, C for 01, G for 10, T for 11)

i. ASCII of each character of medialcipher text is converted into its binary equivalent in 8-bit representation.
ii. Binary sequence is broken into group of two characters to transform into DNA sequence.

Step 4: Interweaving Process on DNA sequence.

Interweave matrix is constructed by representing DNA sequence in form of a square matrix, dimension of the matrix depends on the length of the sequence.

Step 4(a): Construction of Interweave matrix

i. Interweave matrix is constructed by representing DNA sequence in form of a square matrix.
ii. Matrix is constructed in a column wise manner from the sequence in reverse order.

Step 4(b): Interweaving Process:

i. Upward circular rotation is performed on the 1st column of the matrix.
ii. Left circular rotation is performed on the 1st row of the matrix.

Step 5: Generating Terminalcipher Text.

i. Matrix after interweaving is represented in a sequence.
ii. Remaining DNA sequence is added to the sequence in reverse order to form the terminalcipher Text.

ALGORITHM:

Part 2: Decryption

Step 1: Interweaving Process on DNA sequence.

Step 1(a): Construction of Inverse-Interweave matrix

i. Inverse interweave matrix is constructed by representing terminalcipher text in form of a square matrix.
ii. Dimension of the matrix depends on the length of the sequence. Matrix is constructed in a column wise manner from the sequence in sequential order.

Step 1(b): Inverse-Interweaving Process:

i. Right circular rotation is performed on the 1st row of the matrix:
ii. Downward circular rotation is performed on the 1st column of the matrix:

Step 2: Generating Original DNA sequence.

i. Matrix after inverse interweaving is represented in a sequence.
ii. Matrix represented sequence is appended with the remaining sequence in reverse order to get the original DNA sequence.

Step 3: Binary Equivalent of DNA.

i. Inverse DNA encoding is applied to change the DNA sequence in binary format.

Step 4: Medialcipher text of Binary.

i. From the binary value the ASCII values are deduced.
ii. Medialcipher text is deduced from the ASCII value.

Step 5: Decryption using 10x10 substitution matrix to get original message.

i. 10x10 substitution matrix is constructed using a keyword.
ii. Medialcipher text is broken into group of two characters or doublets
iii. Decryption is done by the inverse rule of encryption.

Step 6: Original message is generated by eliminating the filler character 'æ'(Dipthong).