OBJECTIVE:

To implement Quine-McCluskey algorithm as program.

DESCRIPTION:

The Quine–McCluskey algorithm (or the method of prime cubes) is a method used for minimization of Boolean functions that was developed by Willard V. Quine and extended by Edward J. McCluskey. It is functionally identical to Karnaugh mapping, but the tabular form makes it more efficient for use in computer algorithms, and it also gives a deterministic way to check that the minimal form of a Boolean function has been reached. It is sometimes referred to as the tabulation method.

ALGORITHM:

Step 1 − Arrange the given min terms in an **ascending order** and make the groups based on the number of ones present in their binary representations. So, there will be **at most 'n+1' groups** if there are 'n' Boolean variables in a Boolean function or 'n' bits in the binary equivalent of min terms.

Step 2 − Compare the min terms present in **successive groups**. If there is a change in only one-bit position, then take the pair of those two min terms. Place '2' in the differed bit position and keep the remaining bits as it is.

Step 3 − Repeat step2 with newly formed terms till we get all **prime cubes**.

Step 4 − Formulate the **prime cube table**. It consists of set of rows and columns implemented using dictionary. Prime cubes appear as the keys of the dictionary and minterms corresponding to each cube appended in a list.

Step 5 –Traverse through each values(minterms) pair in the dictionary,if a particular value occurs only once,return its corresponding prime cube.These are **essential prime cubes**.

Step 6 - Duplicate the previous dictionary and store it in new_dict.Delete key-value pairs in new_dict if they are essential prime cubes.Append all values of the dictionary to a list and unnest the list .

Find items in this list which occur multiple number of times.Add it into a list 'lfinal'.

Select prime cubes(keys) corresponding to llist as value.These are **selective prime cubes**.

Step 7 – The final minimized expression is the **sum of selective prime cubes and Essential prime cubes**.

SOURCE CODE:

Executable Python file attached herewith,along with a text file containing source code.

OUTPUT: