(I) Karnaugh Map: List all possible minimal two-level sum-of-products expressions of the following function. Give the results in Boolean expressions.

\[ f(a, b, c, d) = \sum m(0, 5, 9, 10, 13) + \sum d(2, 7). \]

(II) Quine-McCluskey Method: Find a minimum sum-of-products form of the following function using the Quine-McCluskey method. Show your process of deriving the prime implicants and include the implication chart. Give the result in Boolean expressions.

\[ f(a, b, c) = \sum m(0, 1) + \sum d(6, 7). \]
(III) Universal Set of Modules:

a. Describe the definition of **universal set of modules**.

b. Check if the set in the following list is universal and explain your decision. Assuming constants 0 and 1 are available.
   i. \{NAND, NOR\}
   ii. \{XOR, NOT\}
   iii. \{f(x,y)= x'y\}
   iv. \{f(x,y,z)= (x+y)z'\}

(IV) Sequential Network: A sequential network has one input \(x(t)\) and one output \(y(t)\). The network contains two T flip-flops with two input ports \(T_1\) and \(T_0\) and two output ports \(Q_1\) and \(Q_0\). Let \(T_1(t) = x(t) + Q_0'(t)\) and \(T_0(t) = x'(t)Q_1(t)\). The output \(y(t) = Q_1(t) + Q_0'(t)\).

a. Describe the state table.

b. Draw the state diagram.
(V) Implement a JK flip-flop with a T flip-flop and a minimal AND-OR-NOT network.