MC 304 (Theory of computation)
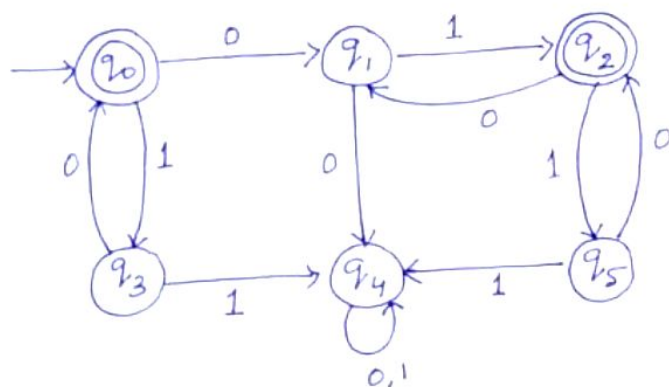
(Class Test 1)

Q1. Construct a minimum state automaton equivalent to the DFA given below:

Q2. $M = (\{ q_1, q_2, q_3 \}, \{0,1\}, \delta, q_1, \{q_3\})$ is an NDFA, where δ is given by

$\delta(q_1, 0) = \{q_2, q_3\}, \quad \delta(q_1, 1) = \{q_1\}$

$\delta(q_2, 0) = \{q_1, q_2\}, \quad \delta(q_2, 1) = \phi$

$\delta(q_3, 0) = \{q_2\}, \quad \delta(q_3, 1) = \{q_1, q_2\}$

construct an equivalent DFA.

Q3. consider the grammar given by

$S \rightarrow 0S1 \,|\, 0A \,|\, 0 \,|\, 1B \,|\, 1, \quad A \rightarrow 0A \,|\, 0, \quad B \rightarrow 1B \,|\, 1$.

Test whether 001100, 001010 are in the language generated by this grammar.

Q4. Let $G_1 = (\{S\}, \{a,b\}, P_1, S)$, where $P_1 = \{ S \rightarrow aSb \,|\, ab \}$

and $G_2 = (\{S, A, B, C\}, \{a,b\}, P_2, S)$, where

$P_2 = \{ S \rightarrow AC, \quad C \rightarrow SB, \quad S \rightarrow AB, \quad A \rightarrow a, \quad B \rightarrow b \}$.

Find $L(G_1)$ and $L(G_2)$. Are they equivalent to each other?