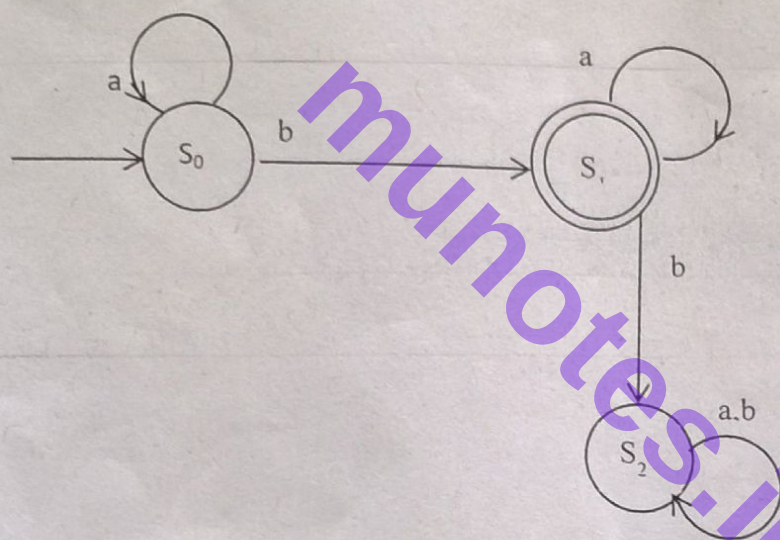


- b) State the Extended pigeonhole principle
Show that if seven colours are used to paint 60 bicycles, atleast 9 bicycles will be of the same colour.
- c) State the sum and product rule.
How many bit string are there of length 8? Also find how many of them ends with two bits 00?
- d) A family of 4 brothers and 3 sisters are to be seated for photograph in one row. In how many ways can they selected i) if all sisters are seat together.
ii) if no two sisters sit together
- e) State the Binomial theorem . Use it to prove
i) $\sum_{k=0}^n \binom{n}{k} = 2^n$ for non-negative integer n.
ii) $\sum_{k=0}^n \binom{n}{k} (-1)^k = 0$, for positive integer n.
- f) State and prove Vandermonde's identity.
- g) State and prove Pascal's identity.
- h) Consider following FSA. Find states, input letters, initial state, accepting state, $f(s_i, b)$, write it's state table



Q 4) Solve the following (any 3)

- a) Solve the non-homogenous recurrence relation $a_n = 5a_{n-1} - 6a_{n-2} + 7^n$.
- b) Define the term i) Lattice ii) Distributive Lattice iii) Bounded Lattice.
- c) Write a note on Binary operations on the graph.
- d) Use Shortest-Path algorithm to find shortest path between the vertices of the following graph.

[15]