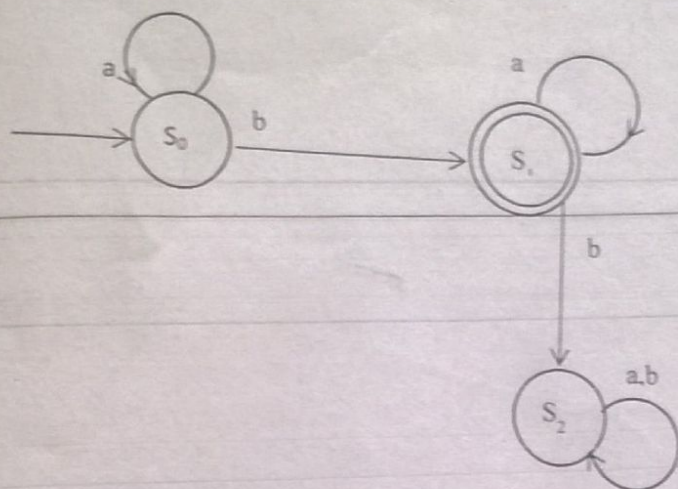


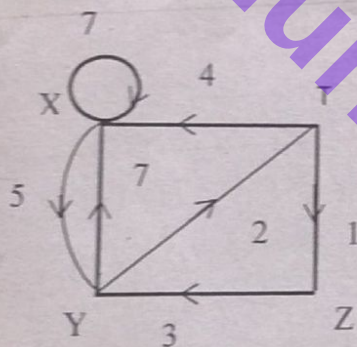
- e) State the Binomial theorem. Use it to prove
 i) $\sum_{k=0}^n \binom{n}{k} = 2^n$ for non-negative integer n .
 ii) $\sum_{k=0}^n \binom{n}{k} (-1)^k = 0$, for positive integer n .
 f) State and prove Vandermonde's identity.
 g) State and prove Pascal's identity.
 h) Consider following FSA. Find states, input letters, initial state, accepting state, $f(s_1, b)$, write its state table



Q 4) Solve the following (any 3)

[15]

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



- d) Define the term Grammar. Write a note on the types of Grammar.
 e) Define a) Turing Machine b) finite state automata c) types of languages.
 f) Determine whether the relation R whose diagram is given is reflexive, irreflexive, symmetric, asymmetric.

