## PART A

1. Compose the difference between the + closure and * closure
2. Define NFA with $\epsilon$ transition
3. State regular expression
4. Write regular expression for the language accepting the strings which are starting with 1 and ending with 0, over the set $\sum = \{0,1\}$.
5. Let G be the grammar S->aB/bA,A->a/aS/bAA,B->b/bS/aBB.obtain parse tree for the string aaabbabbba.
6. Give an example for a context free grammar.
7. How will you say the grammar is ambiguous?
8. Let the production of the grammar be S-> 0B | 1A, A-> 0 | 0S | 1AA, B-> 1|1S | 0BB.for the string 0110 find the right most derivation.
9. Specify the two types of moves in PDA.
10. Give examples of languages handled by PDA.
11. What are the applications of theory of computation?
12. Define ε-closure (q)
13. Define the language accepted by finite automata.
14. Define Context Free Grammar
15. Define Push Down Automata.
16. Define Instantaneous Description of PDA

## PART B

1. Prove by mathematical Induction $0^2 + 1^2 + 2^2 + \ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$

2. Convert the following NFA to DFA
   Let M = (Q,Σ, δ,q0,F)

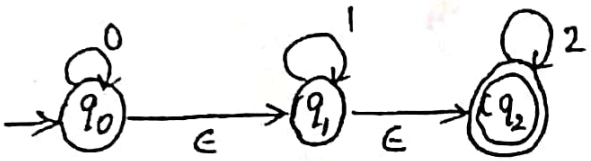
   δ(q0,0)={q0,q1}

   δ( q0,0)={q1}

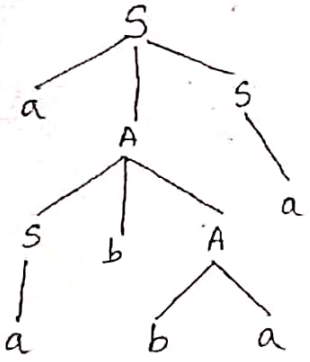
   δ(q1,0)={ }

   δ(q1,1)={q0,q1}

3. Construct an equivalent NFA for the following




4. Discuss on Finite Automata with epsilon Transitions.
5. Find the left most and right most derivation corresponding to the tree




6. Show that the following grammar is ambiguous.
   E->E+E | E*E | (E) | id
7. Convert the following into Greibach Normal Form:
   $X_1 \rightarrow X_2 X_3$
   $X_2 \rightarrow X_3 X_1 | b$
   $X_3 \rightarrow X_1 X_2 | a$
8. Describe the moves of PDA and specify how the languages are accepted by PDA
9. Construct a PDA for the following grammar S→aSa|bSb|c
10 a)Let G be a grammar s->OB/1A, A->O/OS/1AA, B->1/1S/OBB. For the string 00110101 find its leftmost derivation and derivation tree.
   b) If G is the grammar S->Sbs/a, Show that G is ambiguous.