## Tutorial No. I

- Q. I. Write down the regular expression for the following languages.
  - 1. L= {ab, aab, bab, aabbab, --- } aver == {a, b}
  - > RE = (0+b) \* ab
  - 2. L= {11, 110, 1111, 110110, --- 3 over == {0,13
  - > RE = 17 (0) \* 17 (0) \*
  - 3. A string with odd number of I's over == {0,13
  - + RE = 0\*10\*(11)\* 0\*
  - 4. A string containing either ab or bba over = { a, b}
  - > RE = (a+b) \* (ab+bba) (a+b) \*
- 9. 2. If z = {o,b,c} then find the z', z2, z3
  - + z'= {0,b,c}
    - z2 = { aa, ab, ac, bb, ba, bc, cc, ca, cb 3
    - E3: {aaa, aab, aac, abc, acb, abb, acc, bbb,....}
- 8. 3. Prove the following using mathematical induction?

  1+2+3+----+n = n (n+1)/2
  - Step I : Base Step
    - Let us assum that
    - p(n) = 1 + 2 + 3 + --- + n = n(n+1)/2
    - For n=1 P(1) = 1(1+1) = 1=RH3, LH8=1
      - : LH3 = RHS

$$= (K+1) \left(\frac{K}{2}+1\right)$$

$$= \frac{(k+1)(k+2)}{2}$$

$$= (k+1) ((k+1)+1)$$

0 (1+n) n = n+----+8+0+1

$$\rightarrow$$
 Bose Step: For  $n=0$ ,  $f(0)=1$ ;  $n=1$ ,  $f(1)=1$ 

Inductive step:  $f(n)=n*f(n-1)$ 

- b. Fibonacci Function
- + Bose step: For n=0,1, F(0) =0, F(1)=1 Inductive step: F(n) = F(n-1) + F(n-2) For n ?!
- 8. 5. Find the recursive defination of set {1,3,6,10,15,21,--- }

+ Base step: for n=1 f(1)=1 Recursive step: for n>1, f(n) = n + f(n-1)

- 6. If == {0,13, then find the following languages
  - a. The language of string of length zero
    - 1= 2~3
  - b. The language of strings of 0's and I's with equal no. of each. L= {01, 0011, 0101, 000111, 010101, ---- 3
  - c. The language { on 19 1 n > 13
  - L= {01,0011,000111,00001111,---- 3
  - d. The language {0' 1' 10 < i < i }

    → L= {€,0,00,000,----3

  - e. The language of strings with odd no. of 0's & even no. of 1's. → L= { 011, 101, 110, 00011, 01010, 01100, 11000, --- 3

- 7. Define the Kleen Closure, Positive Closure & Power of alphabete
  - 1. Kleen Closure
  - The set of all the strings over on alphabet z is called The set of all the stand is denoted by 2\*. Thus, kleen clasure Kleen Closure of 2 and is set of all the strings over aphabet & with length a or more

e. q. A = {03 A\*= { on/n=0,1,2,3, ---- }

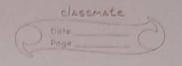
- 2. Positive Closure de de ball ante Elect
- The set of all the strings over an alphabet & Except the empty string is called positive closure & is denoted by &+ . . E + = E 1 U E 2 U E 3 U E 4 U ----
- 3. Power of alphabet the sold in apparet to some in
- The set of all strings of certain length k from an alphab et is the kth power of that alphabet.

i.e. Ex = { W | W | = k'3 1 1 1 0 } appunio ]

If = 20,13 then E° = 3 E 3

2' = { 8, 13 > 10 | 21 | 0 } someone of

- E2 = 900,01,10,113
- 8. Write regular expression for
  - 1. Language containing strings that either starts with or ends with or (01(1+0)\* + (1+0)\*01)



2.	Language and L
	language consisting of strings that have at least two consecutive o's or
	(0+1)*00(0*)(0+1)* + (0+1)* (1)* (0+1)*
	(0+1)* + (0+1)* 11 (1)* (0+1)*

- 3. Language consisting of strings which are starting with lor ending with 0.

  1 (1+0) \* + (0+1) \* 0
- 4. Longuage consisting of string with even lengths of 0's

  > For \( \geq = \frac{1}{2} \quad \geq \geq \geq \quad \quad
- 5. Language consisting string with length exactly two

  For \(\Sigma = \{0,1\} \) L= \{00, 01, 10, 11\} RE = (00+01+10+11)
- 6. Longuage consisting string which starts and ends with diff. symbols

  → For ∑= {a,b} L= {ab, aab, aabb, .... } RE = (a(a+b)\*b+b(a+b)\*a)
- 7. Strings starts with and ends with same symbor = {a,b}

  For \( \Sigma = \{a,b\} \) L= \{a,b,aa,bb,aba,bab,-...\}

  RE = \( (a \)(a+b) \\* a + b \)(a+b) \\* b)