# Lab Assignment-1

Design DFA for the following languages.

1. DFA for strings over the alphabet {a, b}
   i. starting with a and ending with a.
   ii. starting with a.
   iii. containing aa as a substring.
   iv. starting and ending with the same letters.
   v. starting and ending with different letters.
2. DFA for strings over the alphabet {0, 1}
   i. L={w/w starts with a 0 where w ∈ {0, 1}*}
   ii. L={w/w ends with a 1 where w ∈ {0, 1}*}
   iii. L={w/w has length exactly 2 where w ∈ {0, 1}*}
   iv. L={w/w has length at most 2 where w ∈ {0, 1}*}
   v. L={w/w contains the substring 11 where w ∈ {0, 1}*}
3. $L=\{aw_1aaw_2a : w_1, w_2 \in \{a, b\}^*\}$
4. $L=\{ba^n : n \geq 1, n \neq 4\}$
5. $L=\{w \mid n_a(w) \bmod 3 = 0 \text{ and } n_b(w) \bmod 2 = 0\}$
6. L={w : there are exactly two runs of *a*'s of length 3} on {a, b}}
7. All strings with at least one b and exactly two a's on {a, b}
8. All strings that contain substring 000, but not 0000 on {0,1}.
9. Construct deterministic finite automata (DFA) for the language L = { w : w has odd number of 0's and w has odd number of 1's},over the alphabet Σ = {0, 1}.

# Lab Assignment-2

1. Design a Finite machine to recognize the gmail, outlook, yahoo, rediffmail, icloud based mail ids.
2. Design a DFA to recognize the IP addresses of classes A and B separately.
3. DFA to recognize the registration number of all students who belong to various departments including UG and PG in Amrita.
4. To recognize the arithmetic expression with and without parenthesis. Assume the input alphabets as +, -, * and /.
   Example of valid expressions: a+b, a+b*d
5. To recognize the if-else statement with a simple condition block composed of a logical expression.
   Ex: if (a > b) s1; else s2; try for all 6 relational operators. S1 and s2 can be a simple arithmetic expression of the format a=b+c.
6. Generate the DFA or NFA for the following language:
   All valid names of people: a first name and an optional last name and any other middle names or middle initials (e.g. James Bond or James H. H. E. Bond); or any number of initials followed by a single name (e.g. J. H. H. E. Bond). First name, middle name and last name are all in init-caps (i.e. only the first letter is capitalized); initials are a capital letter followed by a period.