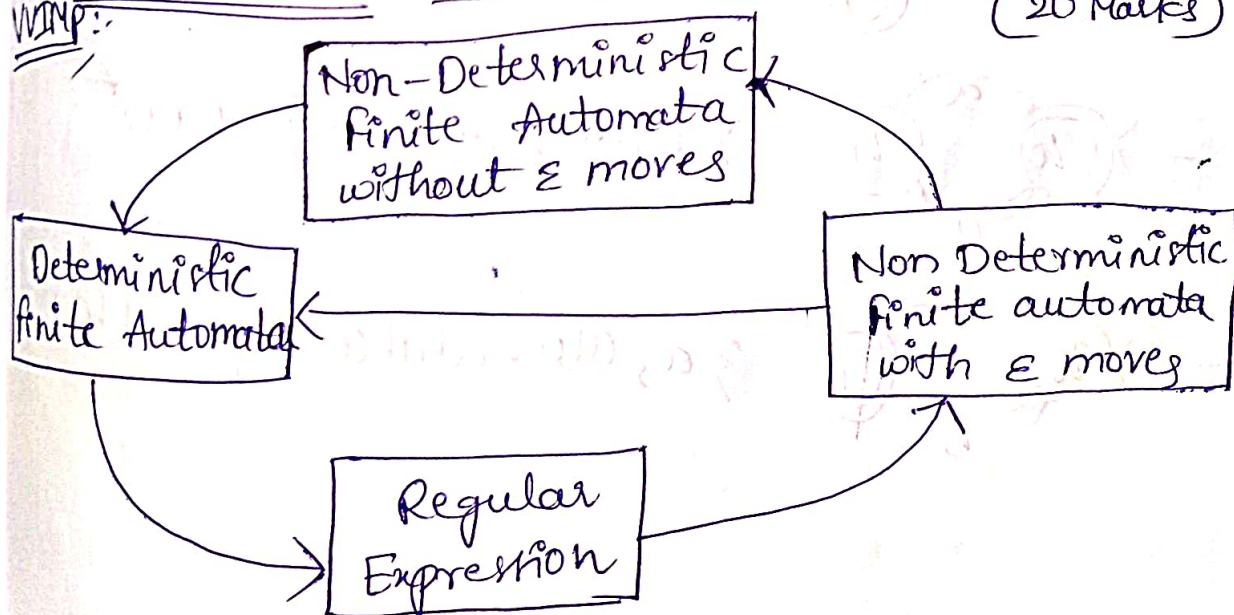


Ques. * Identity Rules for Regular Expression:-
 If P and Q are two equivalent regular expressions i.e. if P and Q represent the same set of strings, to simplify regular expressions the following identity rules can be used:-

- 1) $\phi + R = R$
- 2) $\epsilon R = R \epsilon = R$
- 3) $R + R = R$
- 4) $RR^* = R^*R = R^+$
- 5) $\epsilon + RR^* = R^* = \epsilon + R^*R$
- 6) $\phi R = R\phi = \phi$
- 7) $\epsilon^* = \epsilon \quad \phi^* = \epsilon$
- 8) $R^*R^* = R^*$
- 9) $(R^*)^* = R^*$
- 10) $(PQ)^*P = P(QP)^*$
- 11) $(P+Q)R = PR + QR$
- 12) $R(P+Q) = RP + RQ$
- 13) $(P+Q)^* = (P^*Q^*)^* = (P^* + Q^*)^*$
- 14) $A^*A^+ = \epsilon$

* Equivalence of finite Automata with RE
 (20 Marks)



Finite Automata

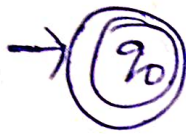
Regular set

Regular Expression



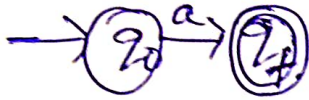
ϕ

ϕ



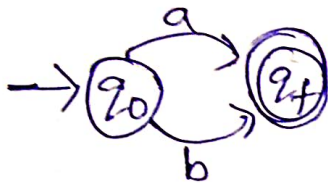
$\{\epsilon\}$

ϵ



$\{a\}$

a



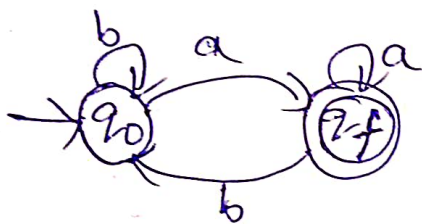
$\{a, b\}$

$a+b$
 $a|b$



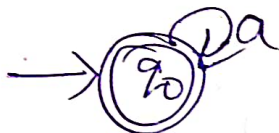
$\{ab\}$

$a \cdot b$



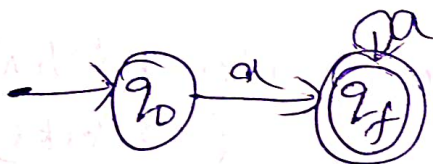
$\{a, aa, \dots,$
 ba, bba, \dots
 $baba \dots\}$

$b(* (ab)^* aa^*)^*$



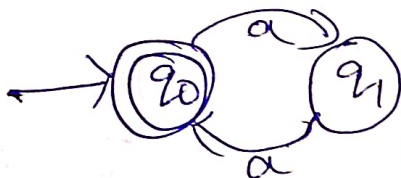
$\{\epsilon, a, aa,$
 $aaa, \dots\}$

a^*



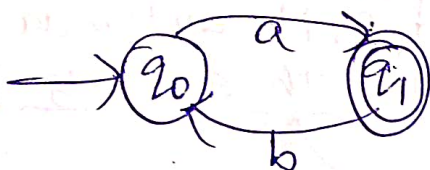
$\{a, aa, aaa, \dots\}$

a^+



$\{\epsilon, aa, (aa)^n, \dots\}$

$(aa)^*$



$\{a, aba, ababa \dots\}$

$a(ba)^*$