1. Which of the following string is accepted by the given DFA?
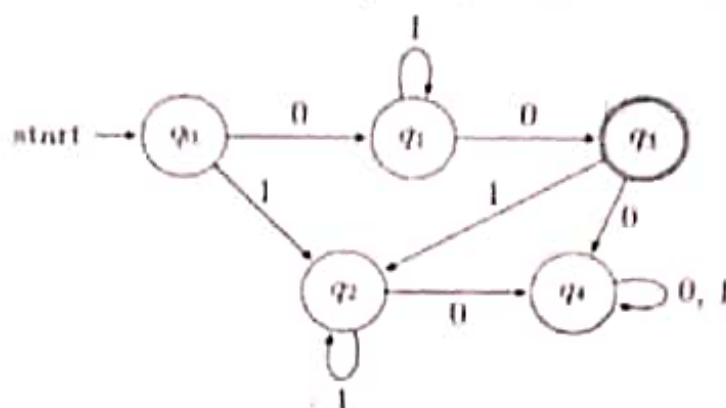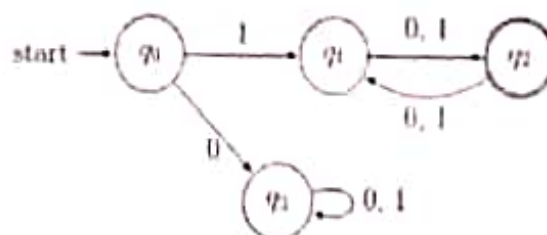

(a) 011110   (b) 101011   (c) 010100   (d) 111000

Answer: _____a_____

2. The Regular Expression for the DFA is _____ $1(0+1)[(0+1)(0+1)]^*$

3. Given the language L= {ab, aa, baa}, which of the following strings are in L*?

(a) abaabaaabaa   (b) aaaabaaaa   (c) baaaaabaaaab   (d) baaaaabaa

Answer: _____

a, b, d

4. If |w| = n, then the number of proper substrings (i.e., without epsilon and w) of w is

(a) $\Sigma n + 1$ (b) $\Sigma n + 2$ (c) $\Sigma n - 1$ (d) $\Sigma n - 2$

Answer: _____

5. Which of the following regular expressions represent(s) the set of all binary numbers that are divisible by three? Assume that the string ε is divisible by three.

(a) $(0+1(01^*0)^*1)^*$ (b) $(0+11+10(1+00)^*01)^*$

(c) $(0^*(1(01^*0)^*1)^*)^*$ (d) $(0+11+11(1+00)^*00)^*$

Answer: _____

a, b, c

6. Consider the language $L1=\{\epsilon\}, L2=\phi$ and $L3=\{a\}$

   $((L3L3) \cup L1) \cap L2 = \underline{\quad \phi \quad}$?

7. Consider the homomorphism h from the alphabet {0, 1, 2} to {a, b} defined by:

   $h(0)= ab, h(1)=b, h(2) =aa$. If L is the language $(ab+baa)^*bab$,

   $h(L) = \underline{\quad (0+12)^+ 10 \quad}$.

8. The number of states in the minimum sized DFA that accepts the language defined by the regular expression $(0 + 1)^* (0 + 1) (0 + 1)^*$ is $\underline{\quad 2 \quad}$.

9. Let δ denote the transition function and $\delta^\wedge$ denote the extended transition function of the ϵ-NFA whose transition table is given below:

δ	ϵ	a	b
$\to q_0$	$\{q_2\}$	$\{q_1\}$	$\{q_0\}$
q_1	$\{q_3\}$	$\{q_3\}$	$\{q_1\}$
q_2	$\{q_0\}$	$\emptyset$	$\emptyset$
q_3	$\emptyset$	$\emptyset$	$\{q_2\}$

   Then $\delta^\wedge$ (q0, aba) is $\underline{\quad \{q_0, q_3\} \{ 1, q_1, q_3\} \quad}$

10. An NFA has 7 states of which 3 are final states. The maximum number of final states in converted DFA would be $\underline{\quad 112 \quad}$.

11. The number of states in minimal (including dead state) deterministic finite automata that accepts all the strings of a's and b's, where every string starting with ab, is $\underline{\quad 4 \quad}$.

12. The sum of minimum and maximum number of final states for a DFA of n states is equal to $\underline{\quad n+1 \quad}$.

13. The number of states in minimal deterministic finite automata that accepts all the strings of a's and b's, where the number of a's is divisible by 3 and the number of b's is divisible by 5, is

   (a) 5   (b) 8   ✓ 15   (d) 243

   Answer: _____

14. The number of strings of length less than 4 contains the language described by the regular expression:$(x+y)^*y(a+ab)^*$ is $\underline{\quad 12 \quad}$.

15. Complement of $(a + b)^*$ over alphabet {a,b} will be $\underline{\quad \phi \quad}$