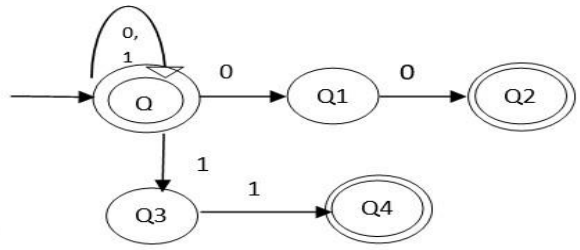
THEORY OF COMPUTATION
ASSIGNMENT QUESTION
MODULE 1 and 2

1. Define Deterministic Finite Automata (DFA). Design a DFA
   - i) To accept strings having Odd Number of a's and even number of b's.
   - ii) To accept the strings having L= {W € (a, b); W has all strings that ends with substring abb}
2. Construct an equivalent DFA from the following given NFA using Subset Construction Method. Refer the below figure.



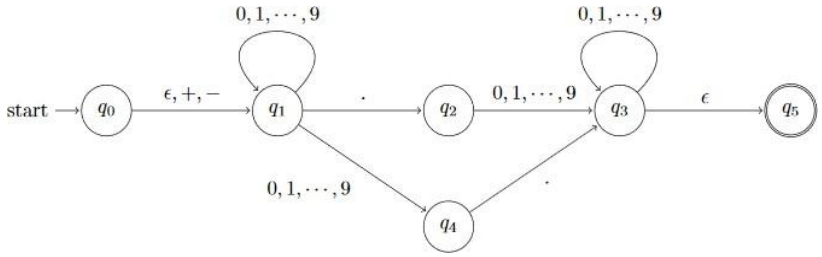
3. Give DFA's accepting the following strings over the alphabet {0,1}
   - i. The set of all strings beginning with 101
   - ii. The set of all strings containing 1101 as a substring
   - iii. The set of all strings with exactly three consecutive 0's
4. Consider the following €-NFA

ẟ	€	A	b
→p	{r}	{q}	{p, r}
q	ϕ	{p}	ϕ
* r	{p,q}	r}	{p}

   - i. Compute the €-closure of each state
   - ii. Convert the Transition table to Transition diagram
   - iii. Convert the automaton to a DFA
5. Design a DFA
   - i. To accept strings of 0's, 1's and 2's beginning with a '1' followed by odd number of 0's and ending with a '2'.
   - ii. To accept the Language L = {w(ab+ba) | w € {a, b}*}
6. Convert to a DFA the following NFA:

	0	**1**
□p	{p, q}	{p}
q	{r}	{r}
r	{s}	ϕ
*s	{s}	{s}

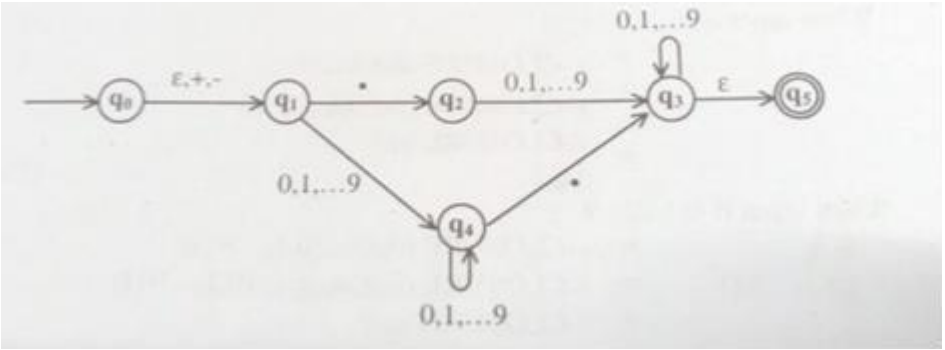
7. For this given €-NFA compute extended transition function of the strings sequence
+9.3.



8.

i. Draw a DFA to accept strings of a's and b's with odd number of a's and odd number of b's.

ii. Explain the Extended transition function to strings for DFA and compute the extended transition function for string sequence 101010.



9. Convert the following €-NFA to DFA.

10. Convert the following NFA to a DFA and informally describe the language it accepts

	0	1
$\rightarrow p$	$\{p, q\}$	$\{p\}$
q	$\{r, s\}$	$\{t\}$
r	$\{p, r\}$	$\{t\}$
$*s$	$\emptyset$	$\emptyset$
$*t$	$\emptyset$	$\emptyset$

11. Define distinguishable and indistinguishable states. Minimize the following DFA

s	0	1
→A	B	A
B	A	C

C	D	B
*D	D	A
E	D	F
F	G	E
G	F	G
H	G	D

12. Write the RE for the following Languages.
    i) Strings having substring aab over alphabet {a,b}.
    ii) Strings of 1's and 2's whose fourth symbol from right end is '1'
13. List out closure properties of regular sets. State and prove the pumping Lemma theorem for regular language. Show that $L=\{a^nb^n \mid n>=0\}$ is not regular
14. Show that regular languages are closed under complement and intersection.
15. Construct an €-NFA for the regular expression 01+01*