PES UNIVERSITY, Bangalore

(Established under Karnataka Act No. 16 of 2013)

Department of Computer Science & Engineering

Automata Formal Languages & Logic

Question Bank - Unit 1

NFA/ λ -NFA

Questions from the Prescribed Textbook

Topic	Exercise No.	Question No's
NFA/ λ -NFA	2.2	Q1 - Q15

Extra Questions

1) Consider the unary number system with the alphabet {1} where a number *n* is represented by a string of *n* 1 s, for example, 4 is 1111 and 7 is 1111111. Construct a finite automaton that accepts all unary numbers that are divisible by 4 but not divisible by 3.

2) Describe the language (i.e., set of all strings) accepted by the following automaton:

State	Input = a	Input = b
$\rightarrow q_0$	q_2	q_1
q_1	q_1	q_1
q_2	q_3	q_2
$*q_3$	q_3	q_2

3) Given the alphabet is {0, 1}, construct a NFA with three states, that accepts L = {w | w contains even no. of 0's or contains exactly two 1's

4) Give an NFA that accepts the language over the alphabet {a, b} where words contain baa as substring or where any a is immediately followed by at least two b's.

5) Construct an NFA that accepts the language {ab, abc}*. That is the language contains the set of strings where ab and abc may be repeated.Example strings include abcab, ababcab,abcabcabc, and the empty string.

6) Construct an NFA for the language { w $\in$ Σ $*$ | w contains at least two 0s, or exactly two 1s } with six states.

Automata Formal Languages & Logic

7) Construct an NFA for the language of all strings over {a, b, c} that end with one of ab, bc, and ca.
8) Construct a NFA that accepts strings over {*a, b*} that contain at least three *a* s or at least two *b* s.
9) Construct a NFA that accepts Binary strings of any length with alternating 0 s and 1 s. The NFA must have just three states (not including reject states). How many states does an equivalent minimal DFA have?
10) Construct a NFA that accepts the following keywords {if, then, else, begin, end, while, goto, return}.