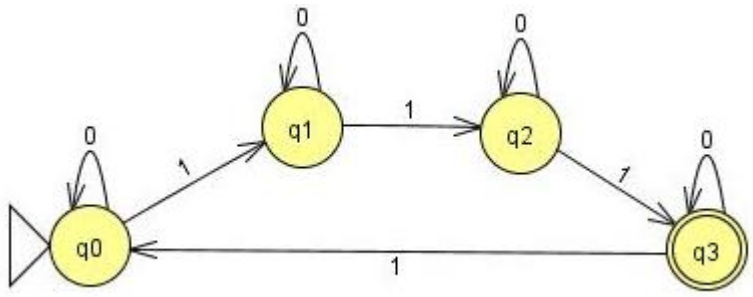
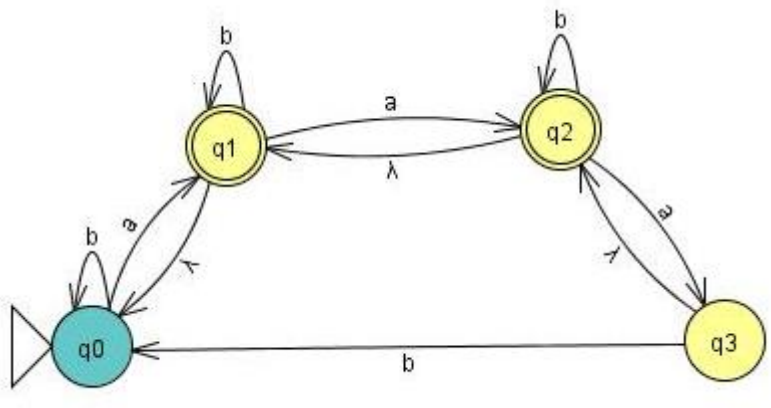
PES UNIVERSITY, BENGALURU-560100

(Estd. Under Karnataka Act 10 of 2013)

Sample Question paper for UNIT 1, 2, 3 practice

UE19CS205 – Automata Formal Languages and Logic

1.	a)	Consider the function defined by the rule f(x)={2x+2 for 0<x<5}, specify the range and domain of the function	2
	b)	Let L be the language , L={ w ∈ {a*} or w ∈{b}* , Σ {a,b}*} Construct a DFA that accepts all the strings that are in L and rejects all the strings that are not in L.	4
	c)	Answer the following: i) Consider the following DFA,  Give one sentence description of the above DFA ii) draw the transition diagram for the FA M={(A,B,C,D),(0,1),δ,c,(A,C)} δ(A,0)=,δ(A,1)={A,B,C) δ(B,0)=B,δ(B,1)={A,C} δ(C,0)={B,C},δ(C,1)={B,D} δ(D,0)={A,B,C,D}δ(D,1)={A}	2+2
2	a)	Construct an NFA with six states that accepts the string over the alphabet {a,b} with either even number of a's or the number of b's is multiple of 3.	6

	b)	Convert the following NFA to DFA  	4
3.	a)	Give a regular expression that accepts a binary strings whose decimal value is divisible by 5 but not by 10	5
	b)	Explain the closure properties of regular languages	5
4.	A	Consider the following grammar: $S \rightarrow aSb\ S \rightarrow aS\ S \rightarrow \epsilon$ (a) Give a one-sentence description of the language generated by this grammar. (b) Show that this grammar is ambiguous by giving a string that can be parsed in two different ways. Draw both parse trees. (c) Give an unambiguous grammar that accepts the same language as the grammar above	6
	B	Let the alphabet be {a, b} and the language be the set of strings with more a's than b's. Show that this language is not regular using Pumping Lemma for regular languages.	4

5.	a)	Consider the following CFG S -> aAS|a A -> SbA | SS | da Answer the following questions: i) What are the terminals, non-terminals and the start symbol of the grammar? ii) Draw parse tree for the following: aabbaa iii) Give leftmost derivation for the above string	6
	b)	Give equivalent grammar in CNF for the following CFG S -> aSbb | T T -> bTaa | S | lambda	4
6.	a)	Give PDA for the following language: $D = \{ a^i b^j c^k \mid i, j, k \geq 0, \text{ and } i = j \text{ or } j = k \}$	4
	b)	For the given grammar, check the acceptance of string w = 10010 using CYK Algorithm- $S \rightarrow XY / YZ$ $X \rightarrow YX / 0$ $Y \rightarrow ZZ / 1$ $Z \rightarrow XY / 0$	6