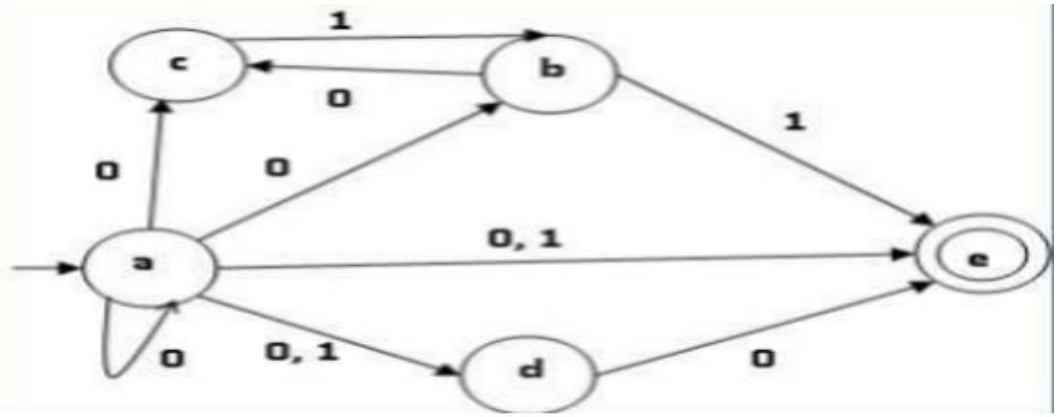
ASSIGNMENT 2

Q. Minimize the given DFA:



Q. Convert the given Moore machine into Mealy machine. Draw state transition diagram of Mealy machine.

Present State	Next State		Output
	0	1	
→p_0	r	q_0	ε
p_1	r	q_0	1
q_0	p_1	s_0	0
q_1	p_1	s_0	1
r	q_1	p_1	0
s_0	s_1	r	0
s_1	s_1	r	1

Q. Write Regular Expressions corresponding to each of the following subsets

of {0,1}*

(i) The language of all strings in {0,1}* that containing at least two 0's.

(ii) The language of all strings containing both 101 and 010 as substrings.

(iii) The language of all strings that do not end w

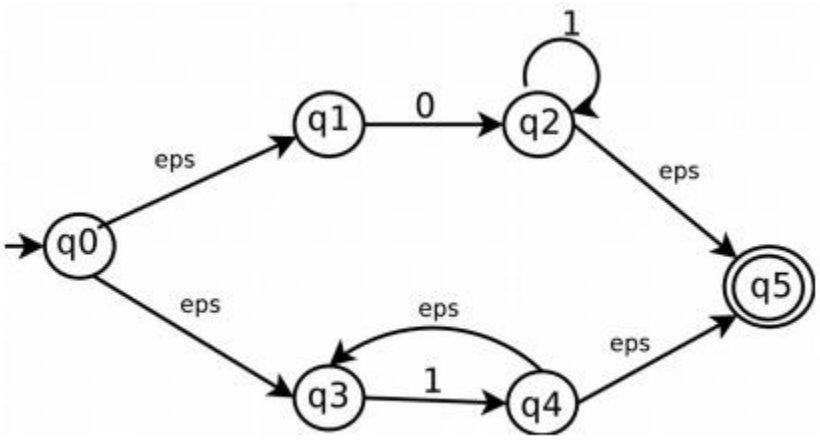
Q. Draw a FA for following regular language.

(i) (11+110)* 0 (ii)(0+1)*(10

Q. Design an NDFA with no more than five states for set $\{abab^n|n>=0\}U\{aba^n|n>=0\}$

Q. Design an NDFA for all strings containing at least two a's or exactly two b's.

Q. Convert epsilon NFA to DFA



Q. Suppose that language A1 has a context-free grammar G1 = (V1, Σ, R1, S1), and language A2 has a context-free grammar G2 = (V2, Σ, R2, S2), where, for i = 1, 2, V1 is the set of variables, R1 is the set of rules, and S1 is the start variable for CFG G1. The CFGs have the same set of terminals Σ. Assume that V1∩V2 = ∅. Define another CFG G3 = (V3, Σ, R3, S3) with V3 = V1 ∪ V2 ∪ {S3}, where S3 ∈ V1 ∪ V2, and R3 = R1 ∪ R2 ∪{ S3 → S1, S3 → S2 }. Argue that G3 generates the language A1 ∪ A2. Thus, conclude that the class of context-free languages is closed under union

Q. Define derivation , types of derivation , Derivation tree & ambiguous grammar. Giveexample for each.

Q. Using pumping lemma for CFL prove that below languages are not context free

{p | p is a prime}

Q. Given the Context Free Grammar G, find a CFG G' in Chomsky Normal Form generating L(G) – { }

$S \rightarrow aY \mid Ybb \mid Y$

$X \rightarrow /\backslash \mid a$

$Y \rightarrow aXY \mid bb \mid XX$

Q. Describe the Chomsky hierarchy of languages.

Q. Show that the CFG with productions

S -> a | Sa | bSS | SSb | SbS is ambiguous.

Q. Prove that There are CFLs L 1 and L 2 so that L 1 ∩ L 2 is not a CFL, and there is a CFL L so that L' is not a CFL.

Q. For the language L = { $xcx^R \mid x \varepsilon \{a,b\}^*$ } design a PDA(Push Down Automata)

Q. Write PDA for following languages: { $a^i b^j c^k \mid i, j, k >= 0$ and j = i or j = k}

Q. $L=\{0^n 1^m \mid n \geq 1, m \geq 1, m > n+2\}$. Construct a PDA for the language L.

Q. Give transition tables for deterministic PDA recognizing following language:

$L = \{x \varepsilon \{a, b\}^* \mid n_a(x) \neq n_b(x)\}$

Trace it for the string abbaababbb

Q. Convert PDA to CFG. PDA is given by P = ({p,q}, {0,1}, {X,Z}, δ, q, Z)), Transition function δ is defined by

$\delta(q, 1, Z) = \{(q, XZ)\}$

$\delta(q, 1, X) = \{(q, XX)\}$

$\delta(q, H, X) = \{(q, H)\}$

$\delta(q, 0, X) = \{(p, X)\}$

$\delta(p, 1, X) = \{(p, H)\}$