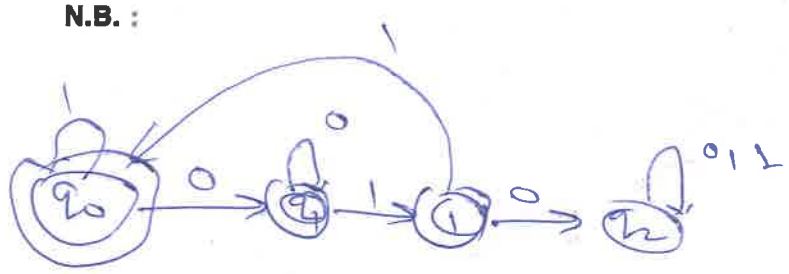
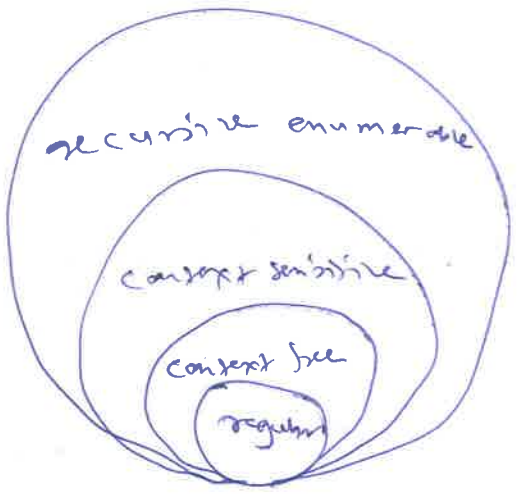
paper code – 00025530

Questions should be —
WRITTEN IN LEGIBLE HANDWRITING IN BLACK INK.
SIGNS, SKETCHES OR FIGURES IF ANY BE DRAWN IN NEAT BLACK INK,
so as to avoid mistakes in the printed question papers.

Duration ..03.. Hours. Total Marks assigned to the paper ...80..

Q. No.		Marks
	N.B. :	
q.1 (a)		(5m)
(b)	CFG for $(11)^*(01+01)^*$ $S \rightarrow AB$ $A \rightarrow CA$ $B \rightarrow DB$ $C \rightarrow A_1A_1$ $D \Rightarrow A_0A_1A_0 \mid A_0A_1$ $A_0 \rightarrow 0$ $A_1 \rightarrow 1$	(5m)
(c)	Chomsky hierarchy 	(5m)

(a) NFA with epsilon :- (5m)

Σ = set of input $\{\varepsilon, a, b\}$ containing ε.

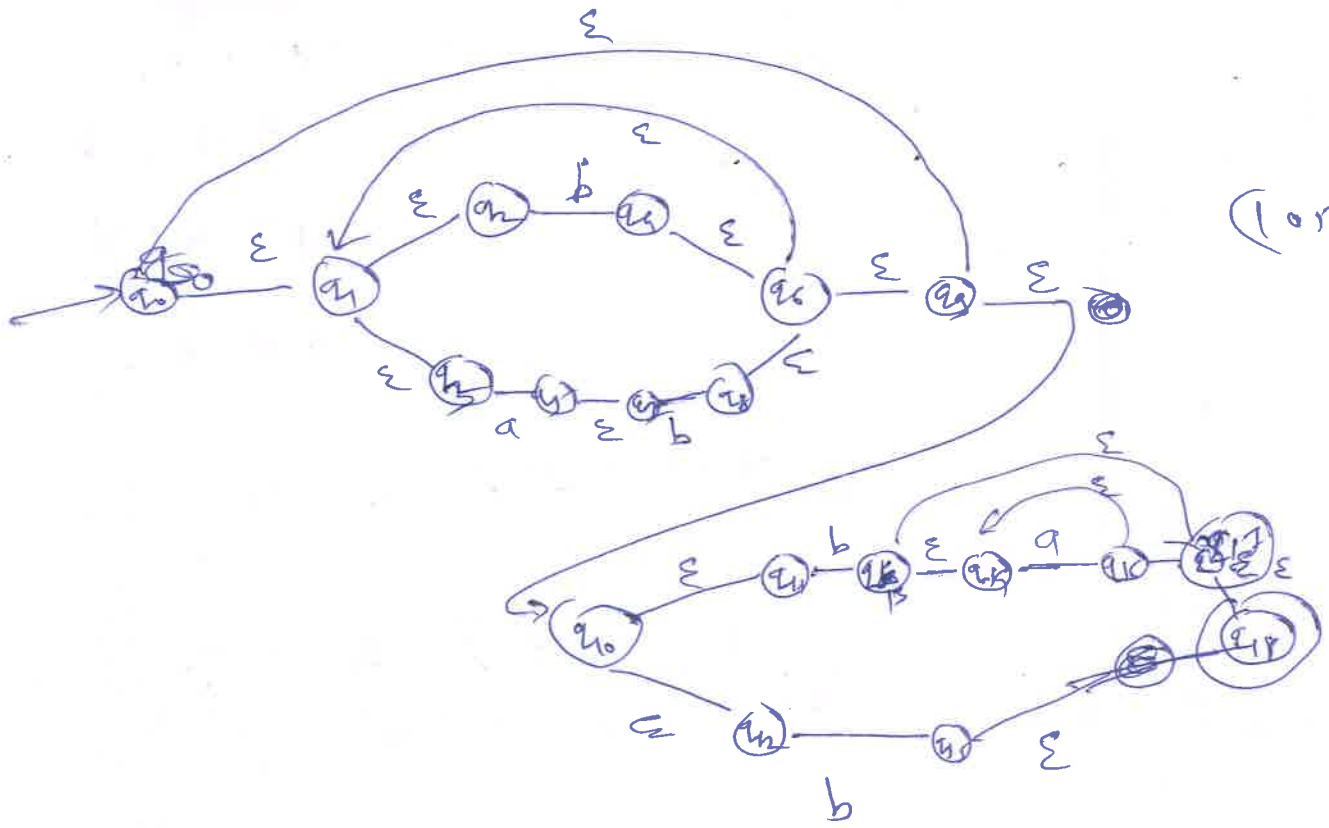
$Q \rightarrow$ set of states

$q_0 \rightarrow$ initial state

$F \rightarrow$ final state

δ - transition function

Q.2 (a) (10m)



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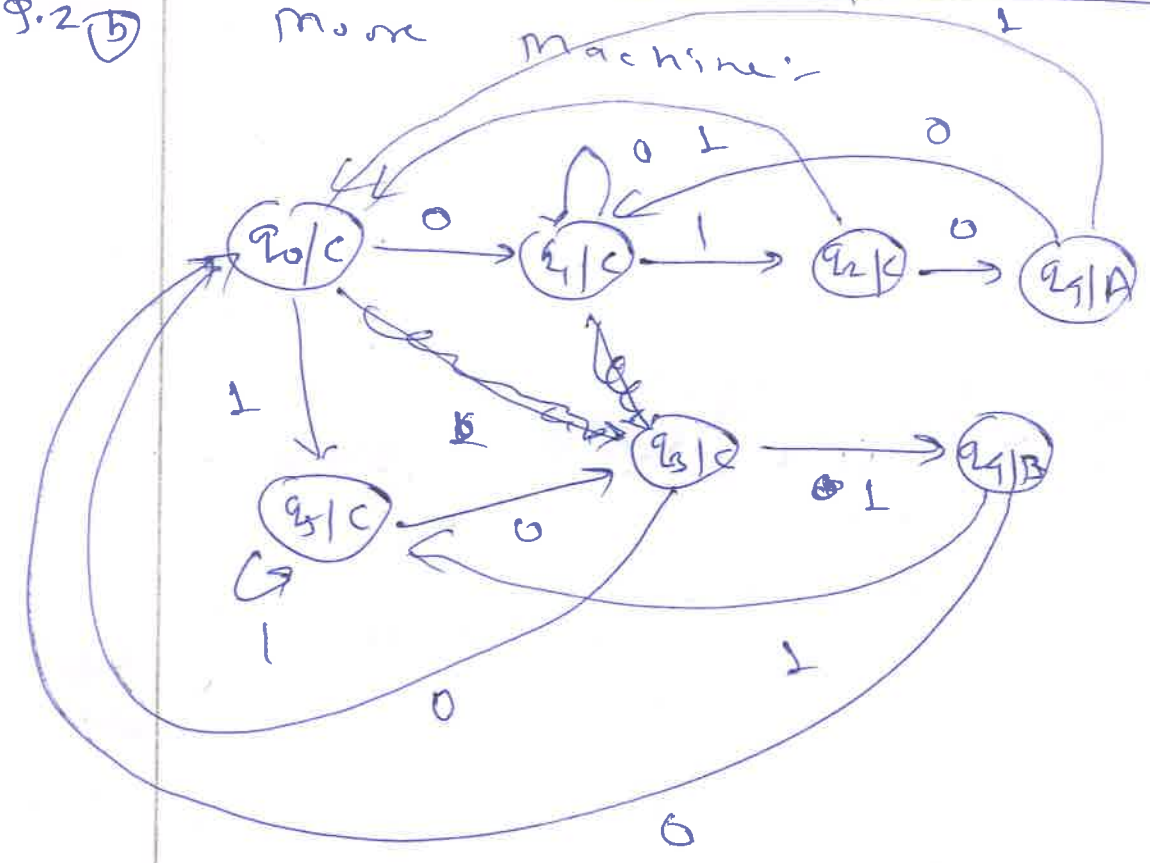
Q. No. | Marks

Q.2 (b)

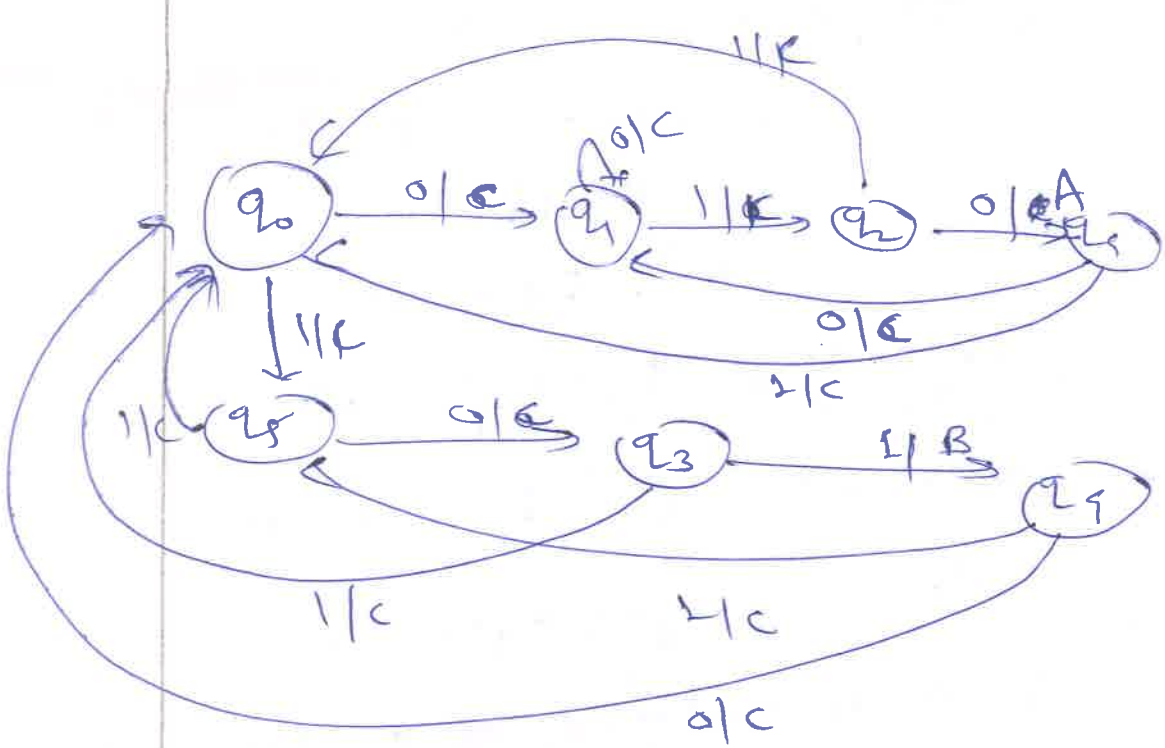
only consider last character of o/p as o/p

Moore Machine :-



(5m)

Mealy machine :-



Q. 3 (a) Let p be pumping length of

$s = a^p b b a^p$

$x = \varepsilon$, $y = a^p$, $z = bba^p$ (1 mm)

$\Rightarrow s = \varepsilon a^p bba^p = a^p bba^p$.

let $|xy| \leq p$

$|y| > 0$

If if we take $i = 2$,

$xy^2z = \varepsilon a^p a^p bba^p$

$s' \notin L$

So 'L' is not regular

Q. 3 b

Minimized DFA

(1 m)

Page No.....

Q. No.		Marks
Q.4 (a)	rules for simplification of CFG.	(10m)

(i) useless production removal:- The production that can never take part in derivation of any string, are called useless production

(ii) ∈ 'b' production:- The production of type 'A → ∈' called ∈ production (null production). These production can only be removed from those grammar that don't generate ∈.

(iii) Unit production:- The productions of type 'A → B' are called unit production

Q.4 (b) CFG =>

$S \rightarrow ASB$

$S \rightarrow \epsilon$

$B \rightarrow SbS \mid A \mid Lb$

$A \rightarrow aAS \mid a,$

(10m)

Remove ∈-production :-

$S \rightarrow ASB \mid AB$

$B \rightarrow Sb \mid bS \mid b \mid A \mid bb.$

$A \rightarrow aAS \mid aA \mid a$

Remove unit production, $B \rightarrow A$

$S \rightarrow ASB$

$S \rightarrow AB$

$B \rightarrow Sb \mid bS \mid b \mid bb$

$B \rightarrow aAS \mid aA \mid a.$

$A \rightarrow aAS \mid aA \mid a$

CNF →

$S \rightarrow aSB$ } $\because A \rightarrow a$

$S \rightarrow aB$

$B \rightarrow aBb \mid bS \mid b \mid bb$

$A \rightarrow aAS \mid aA \mid a$

Q. No.		Marks
9.5 (a)	PDA :- $L = \{a^m b^m c^n \mid m, n >= 1\}$	(10 m)

$(q_0, a, \varepsilon) \rightarrow (q_0, a)$

$(q_0, a, a) \rightarrow (q_0, a)$

$(q_0, b, a) \rightarrow (q_1, \varepsilon)$

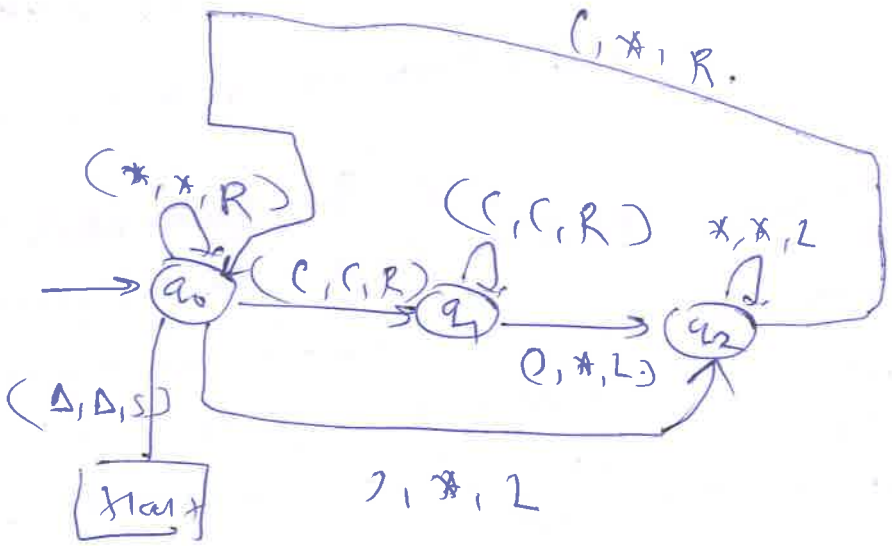
$(q_1, b, a) \rightarrow (q_1, \varepsilon)$

$(q_1, c, \varepsilon) \rightarrow (q_1, \varepsilon)$

$(q_1, c, \varepsilon) \rightarrow (q_1, \varepsilon)$

$(q_1, \varepsilon, \varepsilon) \rightarrow (q_2, \varepsilon) \Rightarrow$ accept

9.5 (b)

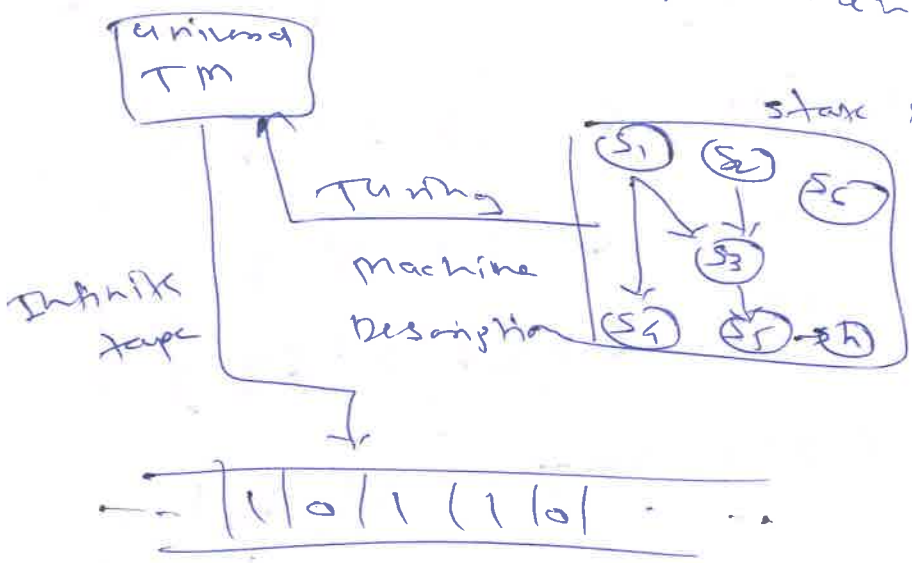


(10 m)

Q. 6 (a) pumping lemma for regular lang:-

In the theory of formal lang. the pumping lemma for regular lang. is a lemma that describe an essential property of all regular lang. specifically, pumping lemma says that for any regular lang. L, there exists a constant p such that any word w in L with length at least p can be split into three substring $w = xyz$ where middle portion 'y' must not be empty. such that words $xz, xyz, xyyz, xyyyz$ can obtained by repeating 'y' zero or more times. (10m)

(b) universal Turing Machines



(c) Unsolvable problem:- (10m)

Def:- A computational problem that cannot be solved by turing machine. The associated function is called uncomputable function.

A problem in computer science is considered unsolved when an expert in the field consider it unsolved or when several experts in the field disagree about solution to problem