

UNIT - 1

1

(a) Differentiate between NFA & DFA

NFA

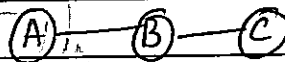
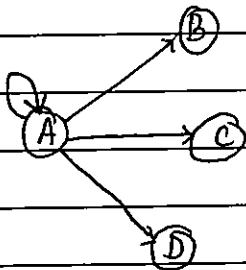
DFA

1. It is Non-deterministic Finite Automata.

1. It is deterministic finite Automata.

2. It has more than one ^{sub} state in state.

2. It has only one state.



3. NFA cannot be DFA

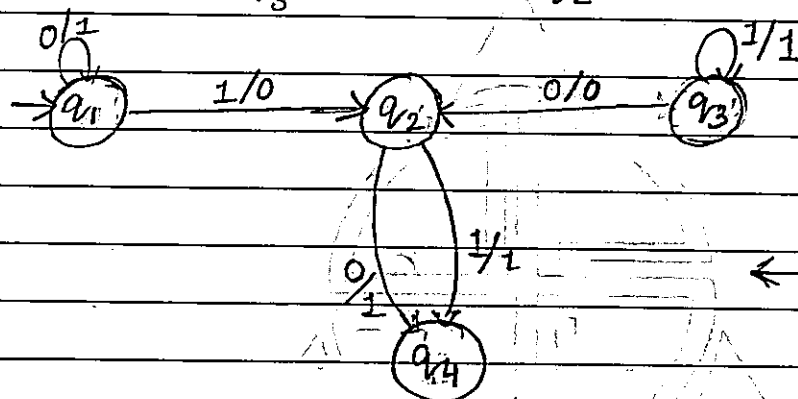
3. Here, DFA can be NFA but not all NFA be DFA

1b Construct a Moore Machine equivalent to Melay Machine

	a = 0		a = 1	
	State	Output	State	Output
→ q ₁	q ₁	1	q ₂	0
q ₂	q ₄	1	q ₄	1
q ₃	q ₂	0	q ₃	1
q ₄	q ₃	0	q ₂	1

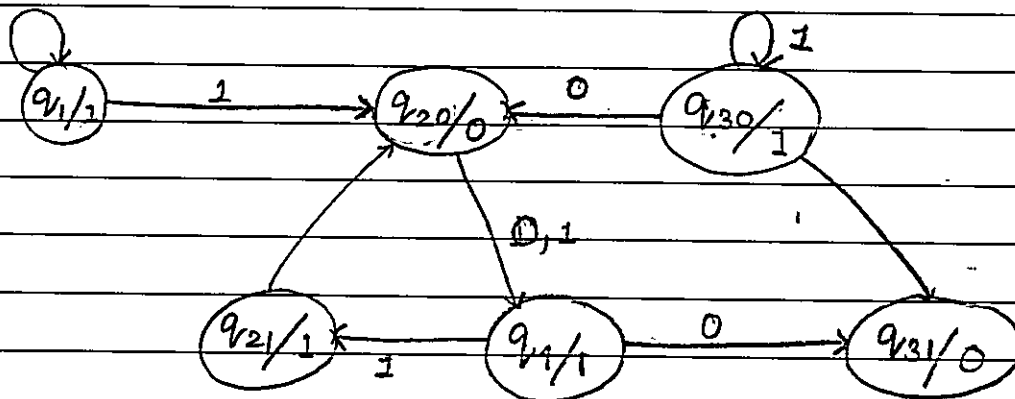
Table for ~~Mealy~~ Moore Machine

	0	1	Output
q_1	q_1	q_{20}	1
q_{20}	q_4	q_4	0
q_{21}	q_4	q_4	1
q_{30}	q_{20}	q_3	1
q_{31}	q_2	q_3	0
q_4	q_3	q_2	1

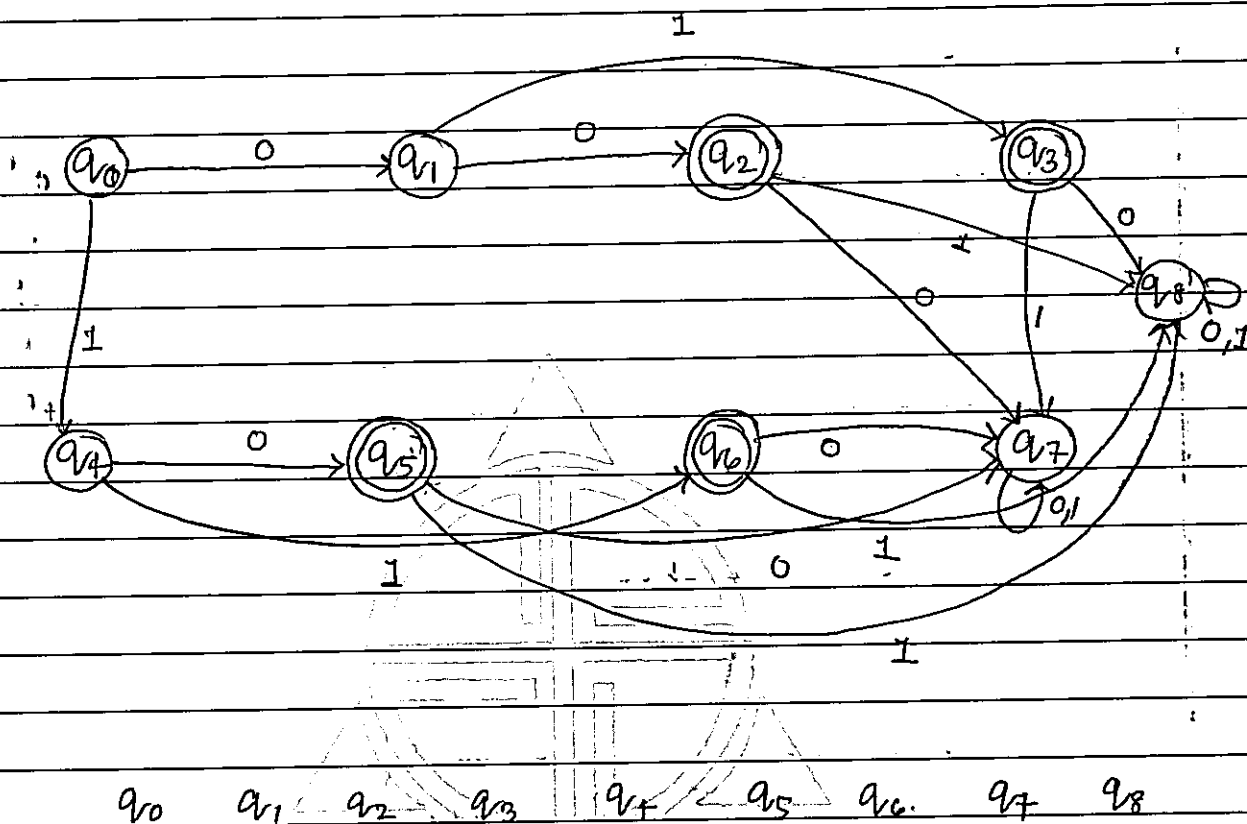


Mealy Machine

Moore Machine



1c Minimise given DFA with my Hill Nerode Theorem



q0

q1	✓							
q2	✓	✓						
q3	✓	✓						
q4	✓		✓	✓				
q5	✓	✓			✓			
q6	✓	✓			✓			
q7		✓	✓	✓	✓	✓	✓	
q8		✓	✓	✓	✓	✓	✓	

Unmarked pairs are: $(q_0, q_1), (q_2, q_3), (q_0, q_4), (q_1, q_4)$
 $(q_2, q_5), (q_3, q_5), (q_2, q_6), (q_3, q_6), (q_0, q_7), (q_1, q_7)$
 $(q_4, q_6), (q_4, q_7)$ or $(q_0, q_8), (q_1, q_8), (q_4, q_8), (q_7, q_8)$

$(q_0 q_1)$

$$\delta(q_0, 0) = q_1 \quad \delta(q_0, 1) = q_2$$

$$\delta(q_1, 0) = q_2 \quad \delta(q_1, 1) = q_3$$

$q_4 q_3$ is masked then we will mask $q_0 q_1$
also ✓

$(q_2 q_3)$

$$\delta(q_2, 0) = q_7 \quad \delta(q_2, 1) = q_8$$

$$\delta(q_3, 0) = q_8 \quad \delta(q_3, 1) = q_7$$

(q_7, q_8) is unmasked

$(q_0 q_4)$

$$\delta(q_0, 0) = q_1 \quad \delta(q_0, 1) = q_4$$

$$\delta(q_4, 0) = q_5 \quad \delta(q_4, 1) = q_6$$

$q_1 q_5$ and $q_4 q_6$ is masked then we will
mark this also ✓

$(q_1 q_4)$

$$\delta(q_1, 0) = q_2 \quad \delta(q_1, 1) = q_3$$

$$\delta(q_4, 0) = q_5 \quad \delta(q_4, 1) = q_6$$

It is unmasked.

$q_2 q_5$

$$\delta(q_2, 0) = q_7 \quad \delta(q_2, 1) = q_8$$

$$\delta(q_5, 0) = q_7 \quad \delta(q_5, 1) = q_8$$

unmasked

$q_1 q_7$

$$\delta(q_1, 0) = q_2$$

$$\delta(q_1, 1) = q_3$$

$$\delta(q_7, 0) = q_7$$

$$\delta(q_7, 1) = q_7$$

masked

(q_4, q_7) masked with same process

(q_4, q_8) masked
 (q_1, q_8)

Unmasked Pairs are (q_1, q_4) (q_2, q_5) (q_2, q_3)

(q_3, q_5) (q_2, q_6) (q_3, q_6) (q_5, q_6)

(q_0, q_7) (q_7, q_8)

So these are the DFA.

UNIT - 2

2

- (a) The closure property of regular grammar is the more the or less than one language in a string

for eg:

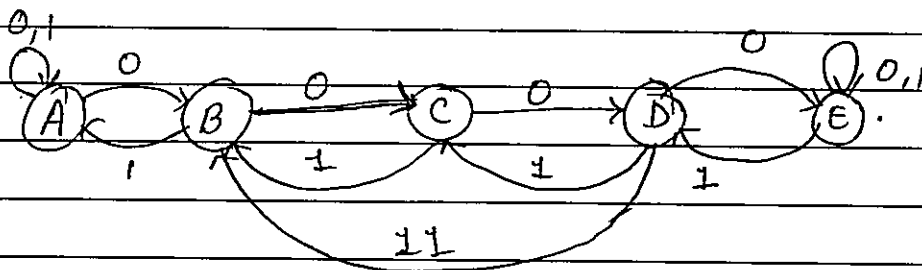
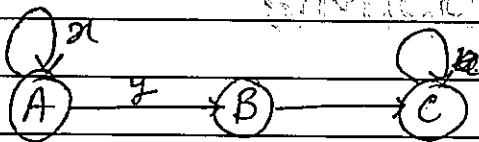
$$a^* = \{ \epsilon, a, aa, aaaa, \dots \}$$

Closure property includes null also denoted by ϵ starts from null value is closure property in regular grammar.

2b

Construct a finite Automata equivalent to regular expression:

$$(0+1)^* (00+11) (0+1)^*$$



2c $L = \{a^n b^n \text{ where } n \geq 1\}$

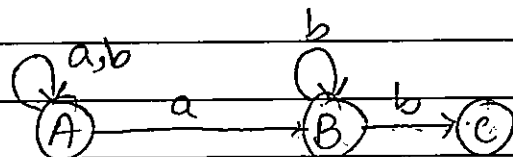
Let

$n=2$

aabb

$n=3$

aaabbbb



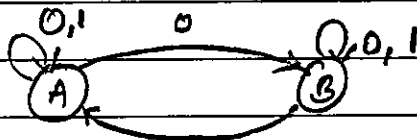
which is not regular.

2d

~~$(0^* + 1^*)^* (0 + 1)^* + 01$~~

2b

$(0+1)^* [(00+11)(0+1)^*]$
 $\leftarrow (0+1)^* (0+1)^*$



UNIT-3

3a

1. 001, 100, 010, 111, 1,

$$L = \{ 001, 100, 010, 111, 1, 1001001 \}$$

2. $L = \{ 100, 000, 10100, 100100, 010100 \}$

3b

Explain chomsky classification of Grammar:

Ans. The class chomsky classification of Grammar are :

1. In the grammar there is non-terminal symbol present in even number.

$$S \rightarrow AB$$

2. If the variable strings present in the language that will be accepted iff one is present

$$S \rightarrow a$$

$$S \rightarrow AB/a.$$

$$S \rightarrow a.$$

3. If the grammar not coming under the Chomsky classification -then we have to convert the grammar in Redⁿ Properties i.e., To remove null Production

4. After doing these process we find that grammar converted into Non-terminal values.

5. ~~Q~~ ~~Q~~ ~~Q~~ ~~Q~~

5. ~~Q~~ Right side or Left side

$$\text{A}_4 \rightarrow \text{A}_2 \text{A}_1$$

$i \downarrow$

$$i \geq m$$

then it is ~~not~~ chomsky form

$$i < m$$

$$4 > 2$$

ज्ञानादव तु केवल्यम्

3d

$S \rightarrow 0B/1A$

$A \rightarrow 0/0S/1AA$

$B \rightarrow 1/1S/0BB$

LMD

$S \rightarrow 0B$ (by $B \rightarrow 0BB$)

$S \rightarrow 00BB$ ~~by~~

$S \rightarrow 001S$ (by $B \rightarrow 1S$)

$S \rightarrow 0011A$ (by $A \rightarrow 1A$)

$S \rightarrow 00110S$ (by $A \rightarrow 0S$)

$S \rightarrow 001101A$ (by $S \rightarrow 1A$)

$S \rightarrow 0011010S$ ($S \rightarrow 0S$)

$S \rightarrow 00110101A$ ~~A~~

$S \rightarrow 001101010$

$A \rightarrow 0$

RMD

$S \rightarrow 1A$

$S \rightarrow 11AA$

$S \rightarrow 11A0S$

$S \rightarrow 11A00S$

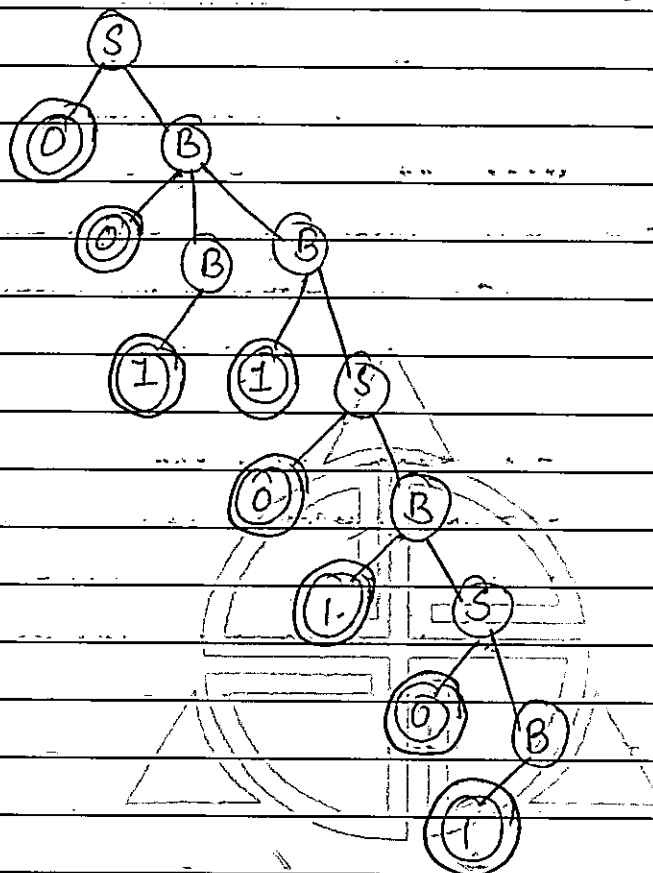
$S \rightarrow 11000B$

$S \rightarrow 110001S$

$S \rightarrow 1100010B$

$S \rightarrow 11000101$

Derivation tree.



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- UNIT - 4

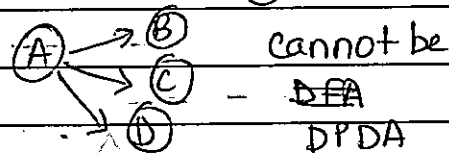
4a

- NPDA

→ It is an Automata designed for Algorithm for Non deterministic

① More than one state.

in state... ② NPDA

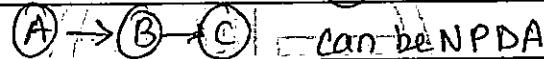


DPDA

→ It is an Automata designed for Algorithm for deterministic

① Only one state.

② DPDA

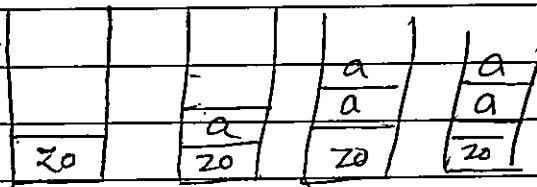


4b

$$L = \{a^n b^{2n} \mid n \geq 1\}$$

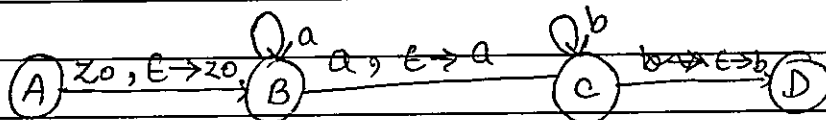
if $n=2$

aaabbbb

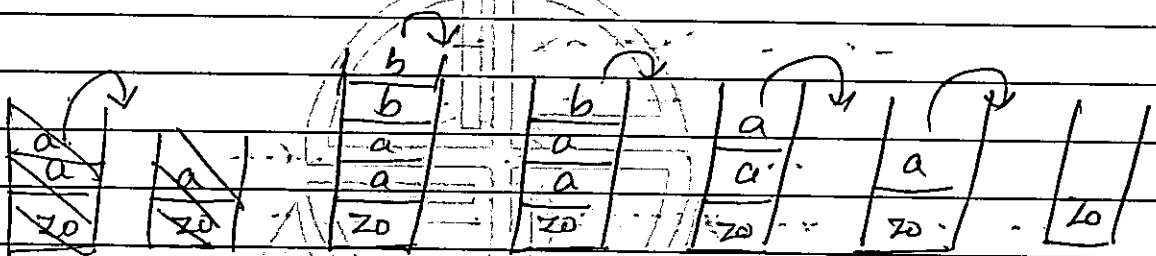
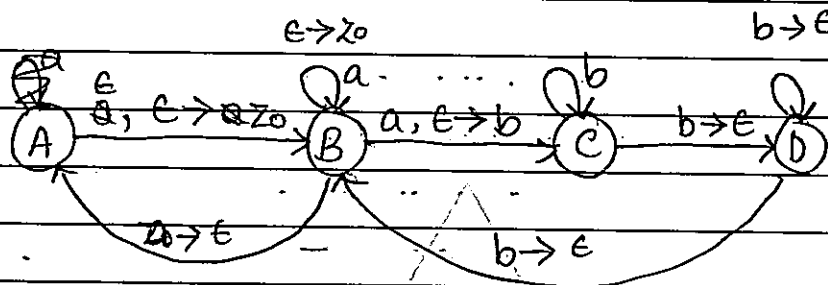


a

a, $\epsilon \rightarrow a$



a.
a
z0



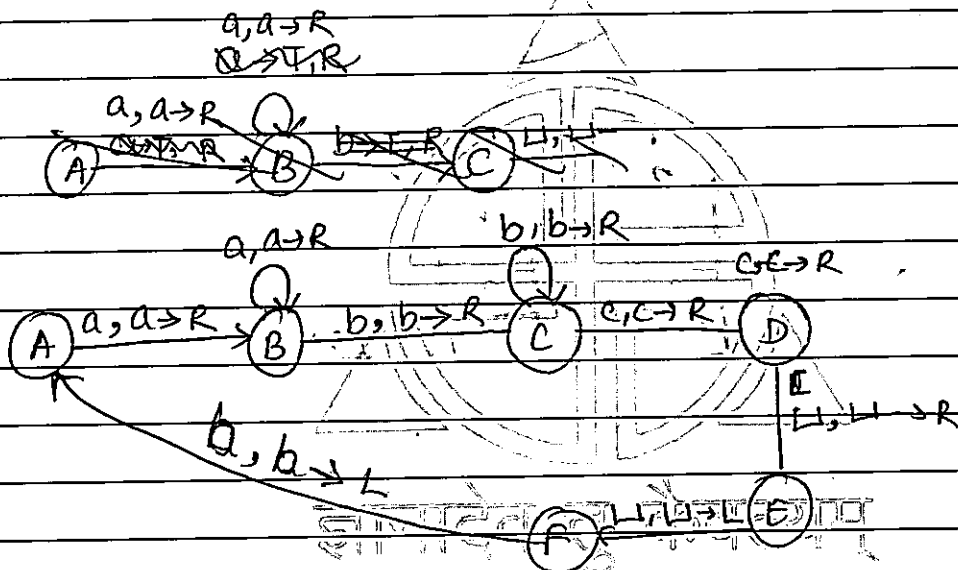
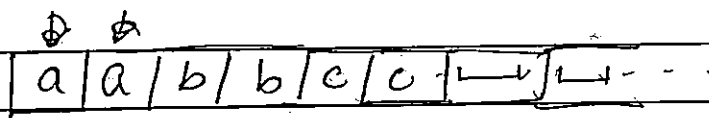
Stack configurations

4c

$L = \{a^n b^n c^n \mid \text{where } n \geq 0\}$

$n = 2$

aabbcc



UNIT-5

5a Partial Function are the function which is applicable for atmost element. If we put value it become but undefined undefined.

Initial Function: It is applicable for

- ① Zero fn $\rightarrow Z(0) = 0$
- ② Successor $F^n \rightarrow S(n+1) = n+1$.
- ③ Infinite $F^n \rightarrow (a \neq, aa, aaa, \dots)$

5d

Ans The working of Turing Model / Turing machine the changes in the machine is computation.

Turing Model of Computation

~~Ans~~ Turing Machine is the Mathematical Computational Model. It is a type of CPU which controls all the data manipulation in a device, or in a computer. In 1930 Turing Machine is launched.

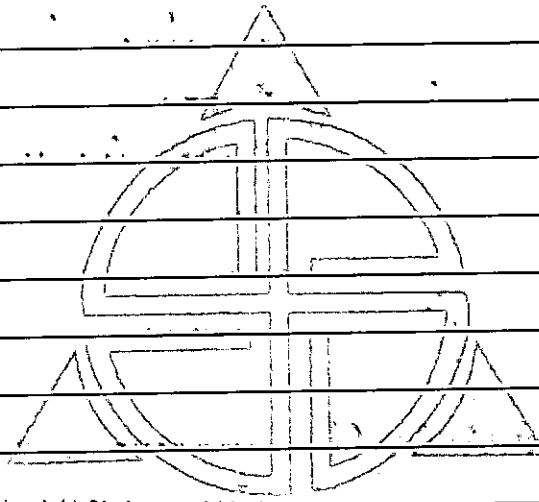
It is used for Data manipulation in the device. It controls the system.

5c

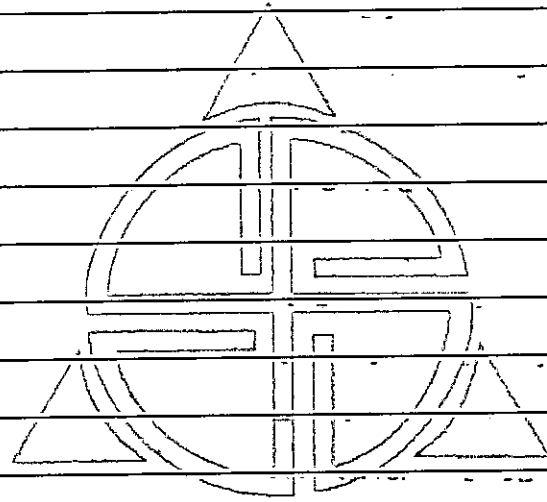
Space and Time Complexity .

Ans

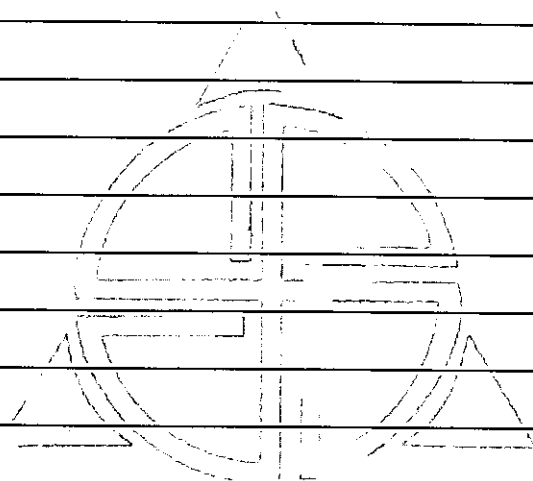
Time complexity : It is a particular time require to work a machine or anything is time complexity



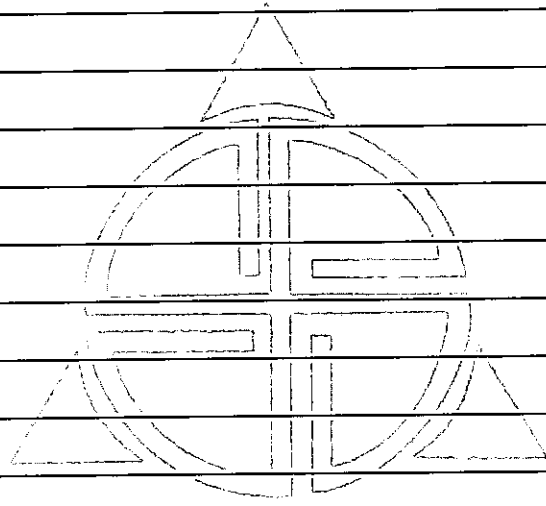
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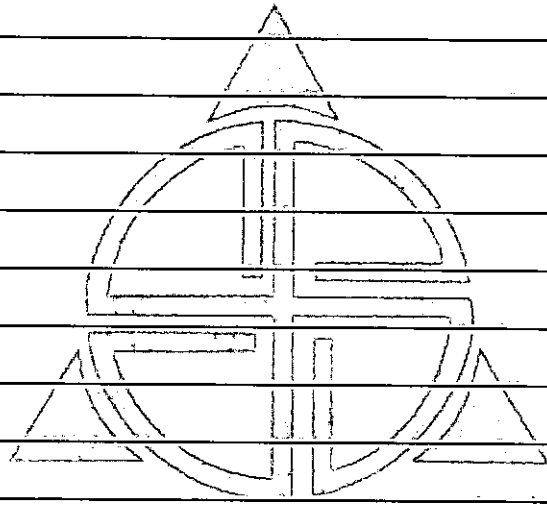
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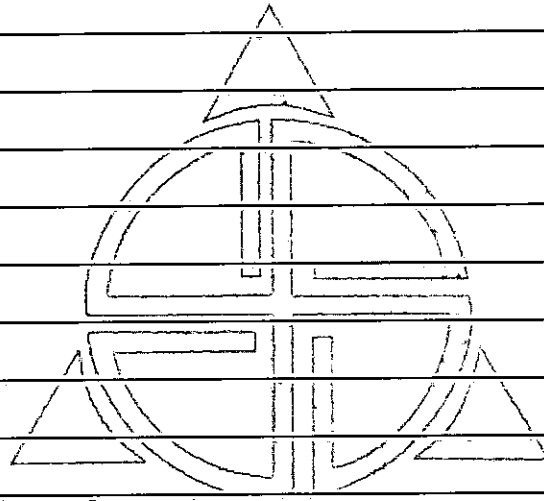
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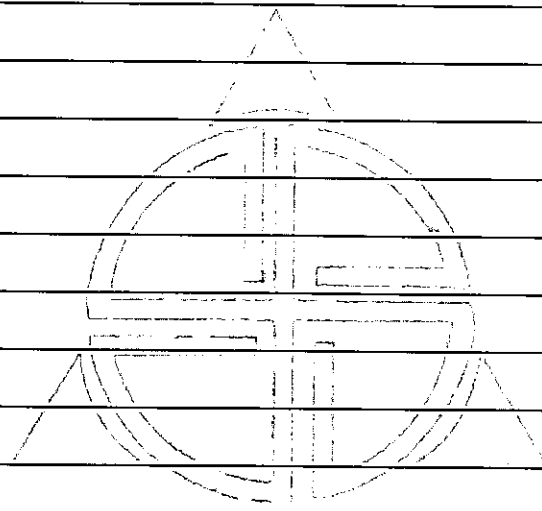
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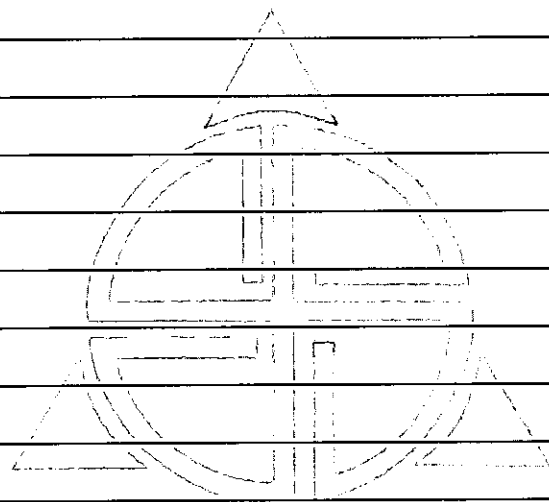
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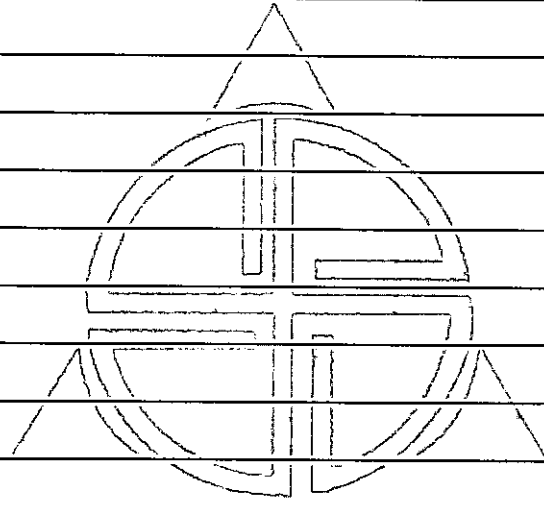
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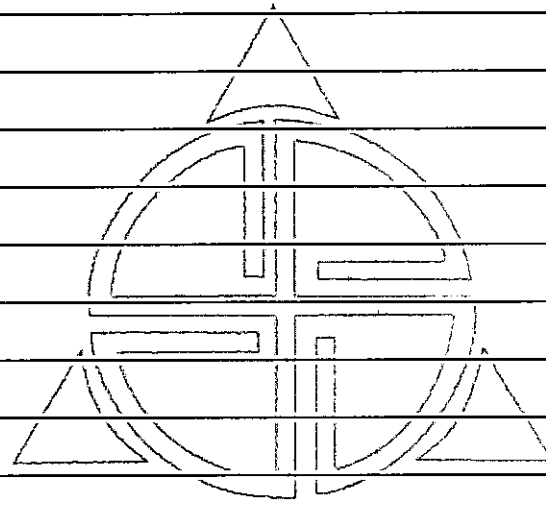
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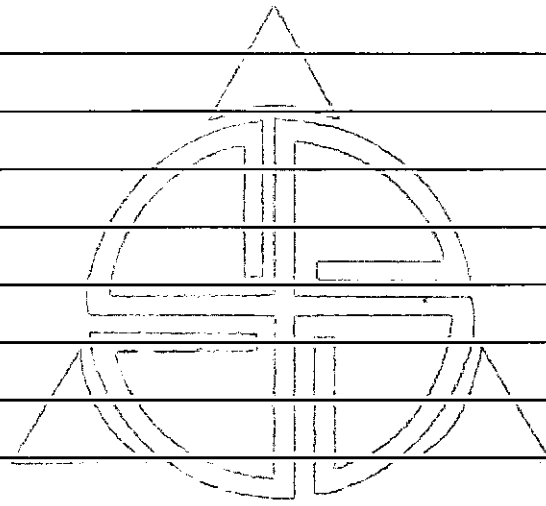
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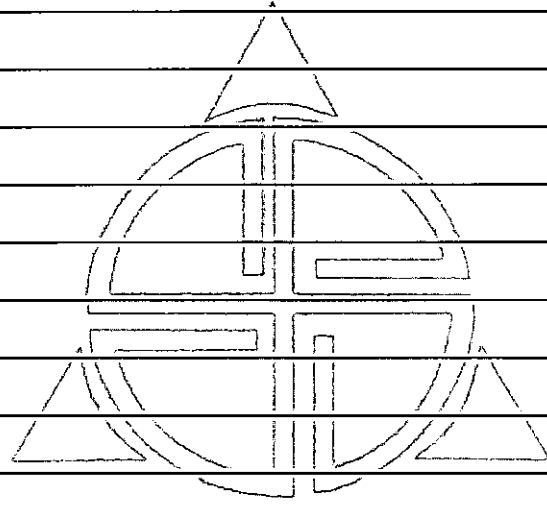
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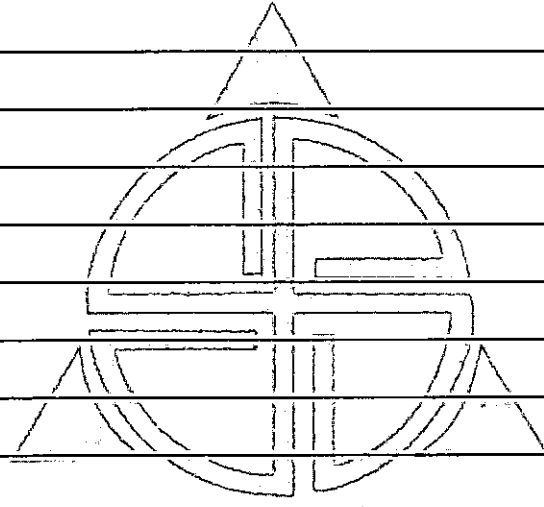
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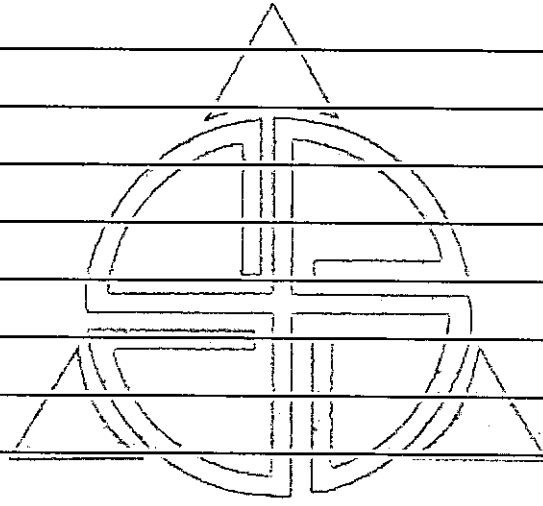
ज्ञानादेव न तैत्तल्याम्
ॐ तैत्तल्याम्



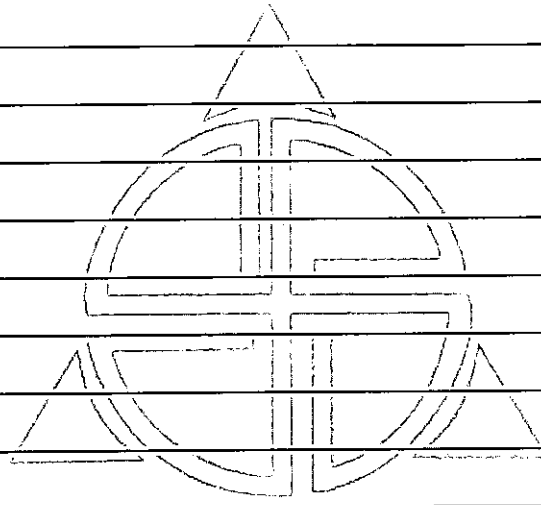
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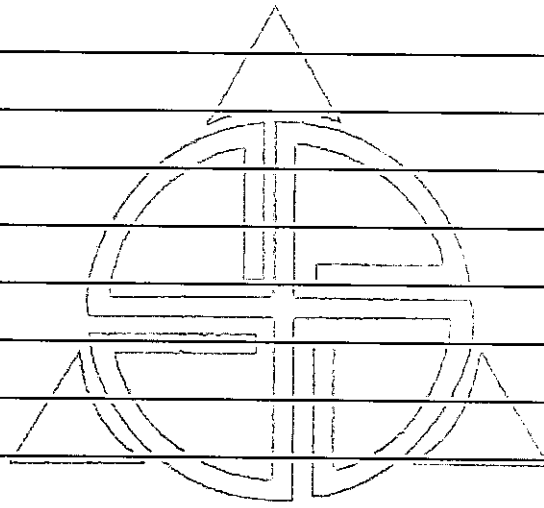
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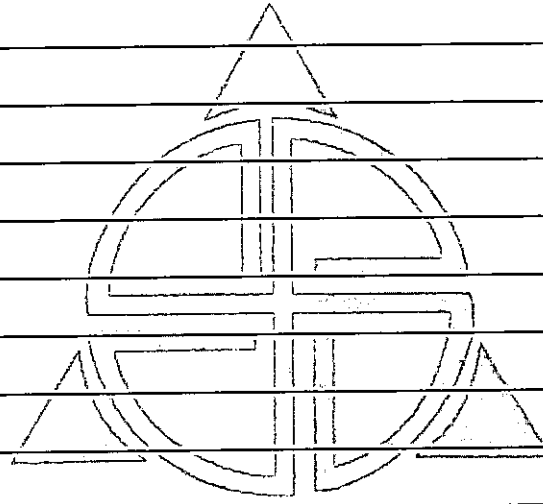
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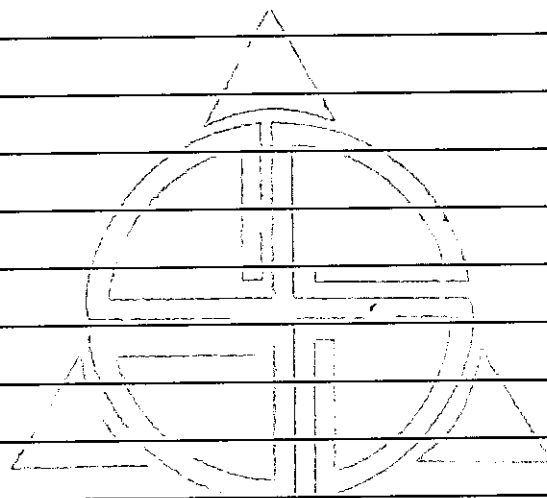
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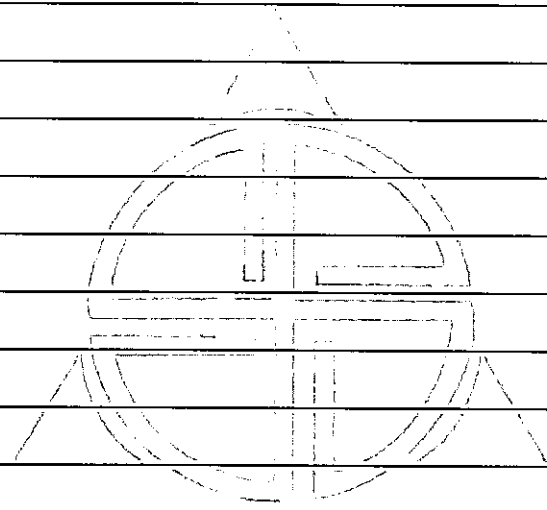
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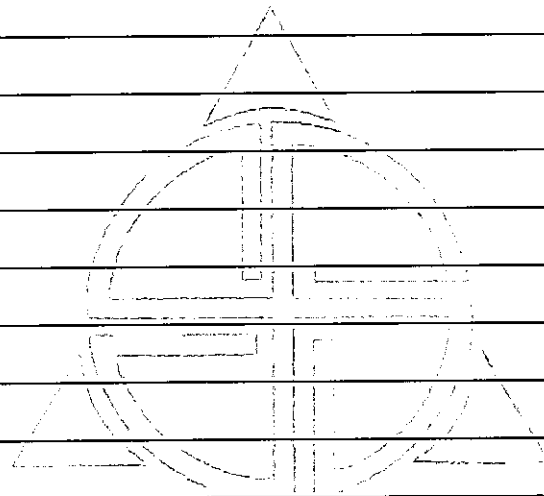
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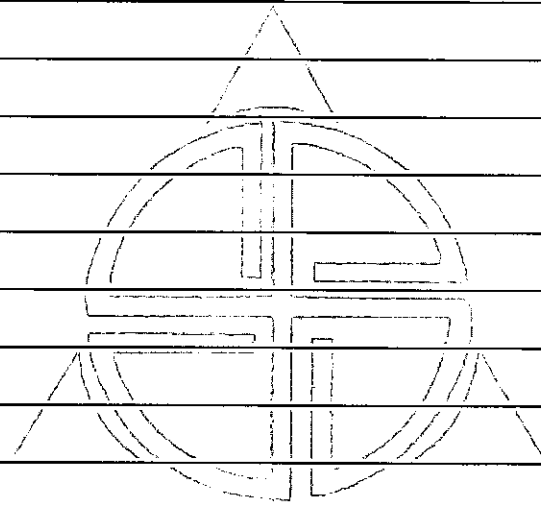
संस्कृत विद्यापीठ



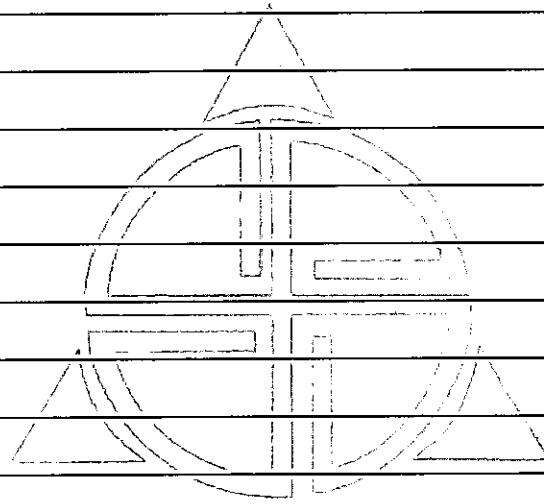
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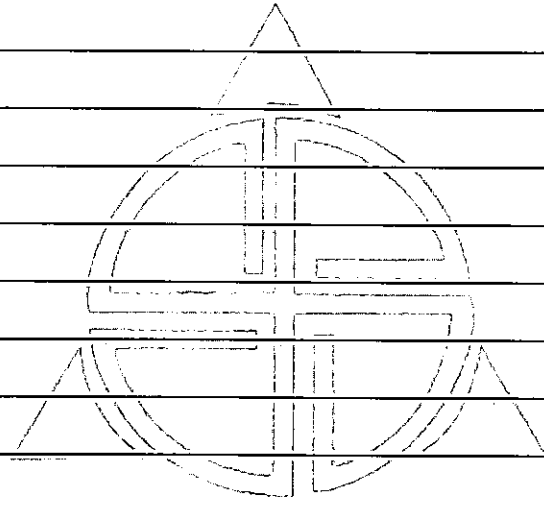
सिद्धि व सुख



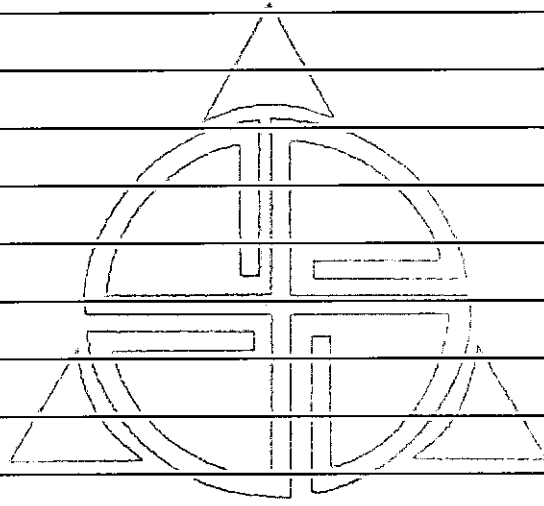
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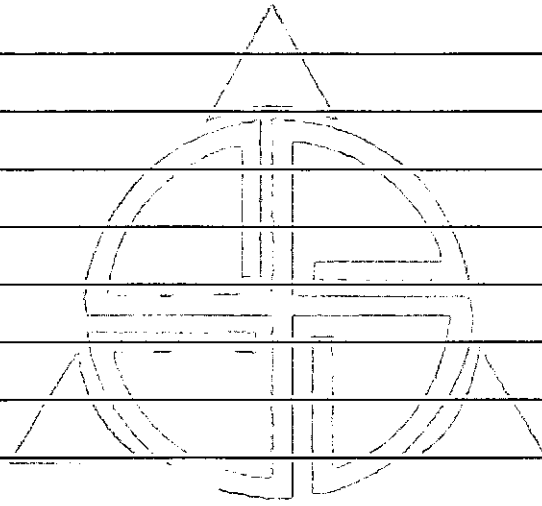
ज्ञानादेव तु कैवल्यम



ज्ञानादेव तु कैवल्यम्



ज्ञानादेव तु कैवल्यम्



ज्ञानार्जुन न केवलम्

10 10 10

10 10 10

10 10 10

