

Term End Examination - May 2012

Course: ITE203 - Theory of Computation Slot: C2+TC2

Time : Three Hours Max.Marks:100

PART - A (8 X 5 = 40 Marks)Answer <u>ALL</u> Questions

1. Minimize the DFA given below. (A – Initial state, E & I – Final states).

States	0	1
A	F	В
В	C	F
С	Н	D
D	G	E
Е	I	I
F	F	F
G	С	D
Н	C	D
I	Е	Е

2. Convert the Mealy machine given below, into Moore machine.

Present	Next State			
State	a = 0		a =	= 1
	Next	Output	Next	Output
	State		State	
q_1	q_2	z_1	q_3	z_1
q_2	q_2	\mathbf{z}_2	q_3	\mathbf{z}_1
q_3	q_2	z_1	q_3	\mathbf{z}_2

- a) Construct the DFA for the language of all strings starting with "00" and ending with "11".
 - b) Give the formal definition of NFA.

[2]

4. Prove that the language $L = \{ a^i b^j c^k | j = k \text{ and } i, j, k \ge 1 \}$ is not regular.

- 5. a) Show that the regular language is closed under complement and reversal.
 - b) Write the regular expression for the language of all strings which has substring [2] "101" and ending with either "000" or "011".
- 6. Show that the grammar G, which has production rules

 $S \rightarrow a$, $S \rightarrow Sa$, $S \rightarrow bSS$, $S \rightarrow SSb$, $S \rightarrow SbS$ is ambiguous.

- 7. Give the names of restricted Turing machine and give the block diagram of any two restricted Turing machines.
- 8. a) Define class P and Class NP

[3]

b) Define LR (0) grammar.

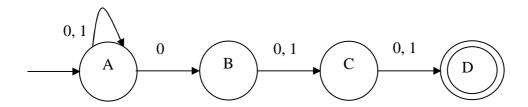
PART - B (6 X 10 = 60 Marks)Answer any <u>SIX</u> Questions

9. a) Convert the NFA given below, in to DFA.

[8]

[2]

[3]



- b) Check whether the string "011101" is accepted or not in the above constructed [2] DFA.
- 10. a) Construct the NFA equivalent to the ε closure NFA given below. (A-Initial State; **[6]** H Final State)

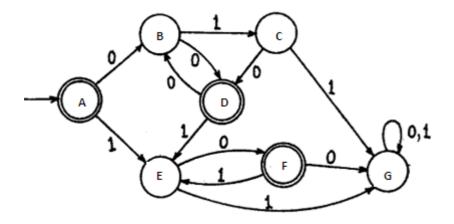
	0	1	ε
A	-	-	{A, B, C}
В	{ D }	1	{B}
C	1	{E}	{C}
D	-	-	{D, F}
E	1	ı	{ E, F}
F	{G}	ı	{F, H}
G	-	{H}	{G}
H	-	-	{F, H}

b) Find out whether the DFAs given below are equal or not. (A & D – Initial states; [4]
C & F – Final states)

	0	1
D	{D}	{E}
E	{ F}	{E}
F	{F}	{F}

	0	1
A	{A}	{B}
В	{ C}	{B}
C	{A}	{B}

- 11. Construct the Turing machine for the language $L = \{ x \in \{a, b, c\} * | n(a) = n(b) = n(c) \}$.
- 12. Find the regular expression equivalent to the DFA given below



a) Give the instantaneous description of Push down automata.

[8]

[2]

b) Construct the pushdown automata for the language $L = \{ a^i b^{i+j} c^j \mid i, j \ge 1 \}.$

14. Construct Chomsky Normal Form for the CFG with production rules $S \rightarrow AACD$, $A \rightarrow aAb \mid \epsilon$, $C \rightarrow aC \mid a$, $D \rightarrow aDa \mid bDb \mid \epsilon$.

a) Find context free grammar G with no null productions where

[6]

[5]

$$G = (\{ S, A, B, C \}, \{ a, b, c \}, \{ S -> AB \mid ABC, \quad A -> BA \mid BC \mid \epsilon \mid a, B -> AC \mid CB \mid \epsilon \mid b, C -> BC \mid AB \mid A \mid c \}, S)$$

- 16. a) Define Context sensitive language and give the block diagram of the machine which [5] recognizes it.
 - b) Write short notes on recursively enumerable language.

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