Total No. of Questions : 6]

SEAT No. :

P72

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Oct./TE/Insem.-191

T.E. (IT)

THEORY OF COMPUTATION

(2015 Course) (Semester - I)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) *Attempt questions Q1 or Q2, Q3 or Q4, and Q5 or Q6.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) a) Construct Mealy machine to find 2' complement of any binary number & convert it into Moore machine. **[8]**

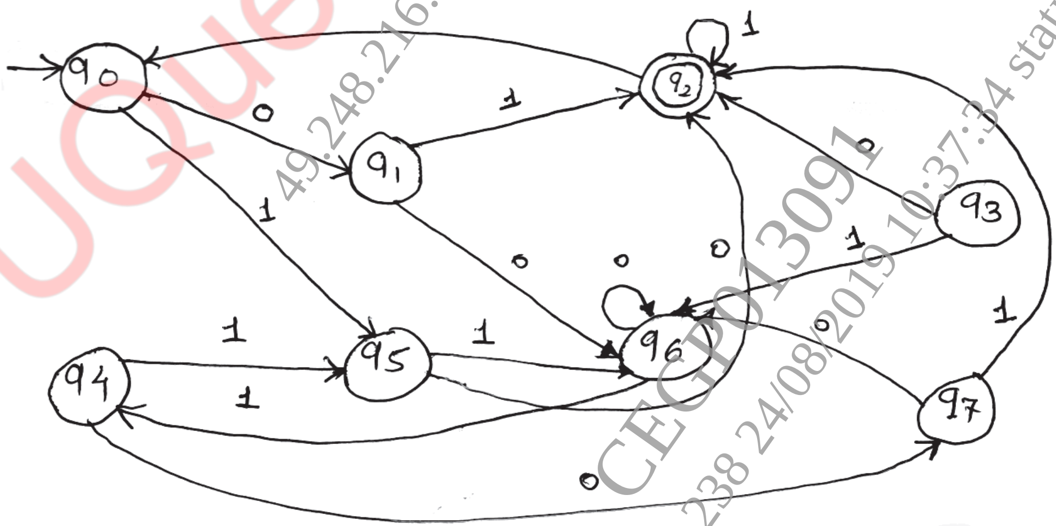
b) Define following:- **[2]**

i) ∈ -closure of a state

ii) NFA

OR

Q2) a) Construct the minimum state automation equivalent to the transition diagram given below. **[8]**



b) State what do you mean by FSM & state limitations of FSM. **[2]**

P.T.O.

Q3) a) Determine the regular expression over the $\Sigma = \{a, b\}$ for the following **[6]**

i) Set of all strings containing exactly 2 a's

ii) Set of all strings containing at least 2 a's

iii) Set of all strings that do not consist of two consecutive 0's

b) Convert the given Right-linear Grammar into its equivalent Left-linear Grammar. **[4]**

$S \rightarrow 0A|1B$

$A \rightarrow 0C|1A|0$

$B \rightarrow 1B|1A|1$

$C \rightarrow 0|0A$

OR

Q4) a) Define Pumping Lemma & Apply it to prove the following $L = \left\{0^{i^2} / \text{i is an integer, } i \geq 1\right\}$ is not regular. **[6]**

b) Describe in simple english the language defined by the following regular expressions:- **[4]**

i) $(a+b)^* \cdot aa \cdot (a+b)^{**}$

ii) $a + b^* \cdot c + \in$

Q5) a) Check whether or not the following Grammar is ambiguous; if it is remove the ambiguity and write an equivalent unambiguous grammar. **[6]**

$S \rightarrow i\ C\ t\ S \mid i\ c\ t\ S\ e\ S \mid a$

$C \rightarrow b$

b) Write note on: Chomsky Hierarchy. **[4]**

OR

Q6) a) Simplify the following Grammar **[6]**

i) $S \rightarrow aA|bS|\in$

$A \rightarrow aA|bB|\in$

$B \rightarrow aA|bc|\in$

$C \rightarrow aC|bc$

ii) $S \rightarrow A|bb$

$A \rightarrow B|b$

$B \rightarrow S|a$

b) Find the CNF for the given CFG $S \rightarrow 0S1S|1S0S|\in$ **[4]**

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