Total No. of Questions : 4]

SEAT No. :

PC-54

[Total No. of Pages : 2

[6360]-55

T.E. (Information Technology) (Insem)

THEORY OF COMPUTATION

(2019 Pattern) (Semester - I) (314441)

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4.***
2) ***Neat Diagrams must be drawn wherever necessary.***
3) ***Figure to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Design a Moore machine to find 2's complement of any binary number. Write the definition of a Moore Machine. **[4]**

b) Find the final DFA (Deterministic Finite Automata) by performing the DFA minimization process. **[5]**

State/input	0	1
$\rightarrow q_0$	q_1	q_0
q_1	q_0	q_2
q_2	q_3	q_1
q_3*	q_3	q_0
q_4	q_3	q_5
q_5	q_6	q_4
q_6	q_5	q_6
q_7	q_6	q_3

c) Write the formal definitions for the following : **[6]**

i) DFA (Deterministic Finite Automata)

ii) Finite State Machine

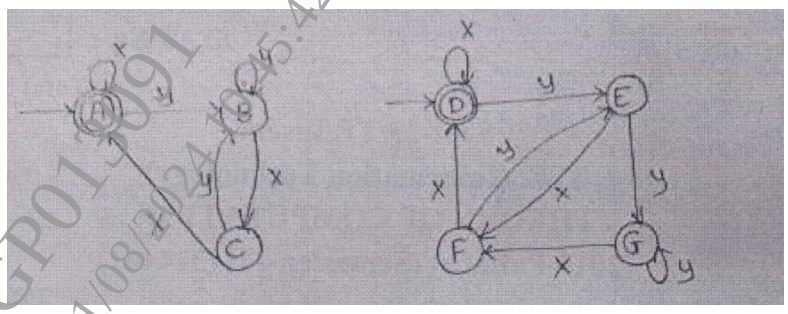
iii) NFA (Non- Deterministic Finite Automata) with ε moves

OR

P.T.O.

Q2) a) Construct a Moore machine for a binary input sequence such that if it has a substring '110', the machine outputs A; if it has a substring '101', the machine outputs B, otherwise machine outputs C. **[5]**

b) Show that following DFAs (Deterministic Finite Automata) are equivalent or not. **[5]**



c) Justify that there can be the equivalent Mealy machine for any Moore machine by suitable example. **[5]**

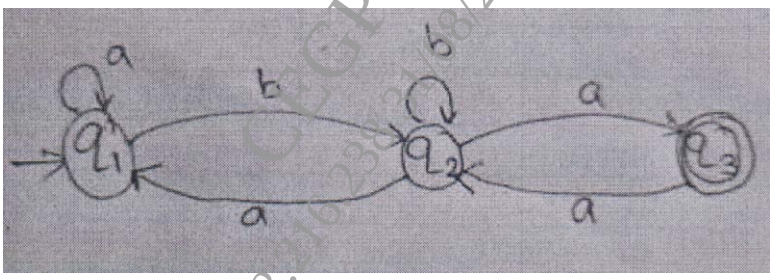
Q3) a) For the following regular expressions, draw the FA (Finite Automata) recognizing the corresponding language. **[5]**

i) ab* + ba* + b*a + (a*b)*

ii) b*a (a+b)*ab*

b) State and explain Pumping Lemma for a regular language. **[5]**

c) Find the regular Expression for the FA (Finite Automata) using Arden's Theorem. **[5]**



OR

Q4) a) Use pumping lemma to check whether the language, $L = \{0^n 1^n \mid n >= 0\}$ is regular or not. **[5]**

b) Represent the following language using regular expression over $\Sigma = \{0,1,2\}$ for the following **[5]**

i) At least one occurrence of 0 followed by at least one occurrence of 1 followed by at least one occurrence of 2.

ii) Any number of 0's followed by at least one occurrence of 1 followed by at least one occurrence of 2.

c) Prove that if R = P + RQ or R = RQ + P then R = PQ* (Arden's Theorem) Where, P,Q and R are regular expressions. **[5]**

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