Total No. of Questions : 6] SEAT No. :

P4859

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T.E./Insem. - 146

T.E. (Computer Engg.)

THEORY OF COMPUTATION

(2012 Pattern) (Semester -I)

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

Instructions to the candidates:

1) ***Answer (either (Q 1 or Q 2) and (Q3 or Q4) and (Q5 or Q6)).***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Give suitable examples wherever necessary.***

UNIT - I

Q1) a) Describe the languages accepted by the following Regular Expressions and justify with suitable examples: **[6]**

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

ii) (1*.0.1*.0.1*)*

iii) a*b+b*a

b) Prove by mathematical induction the following: **[4]**

For all $n \geq 1, \sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$

OR

Q2) a) Apply the theorem of Pumping Lemma to prove that the following language L is regular. **[6]**

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

Draw the finite automata for L.

P.T.O.

b) Draw FA for strings which do not contains '00' as substring in it over alphabet $\Sigma = \{0,1\}^*$ **[2]**

c) Draw NFA for strings ending with '10' over alphabet $\Sigma = \{0,1\}^*$. **[2]**

UNIT - II

Q3) a) Convert the following regular expression to its equivalent DFA: **[8]**

(a + b)* .abb

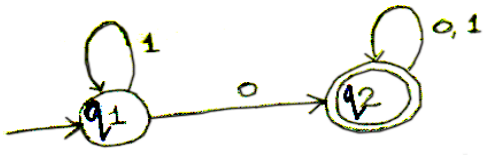
b) What are the limitations of Finite Automata? Justify with suitable examples. **[2]**

OR

Q4) a) Convert following NFA into its equivalent DFA **[4]**

Q \ Σ - >	0	1
->P	P,Q	R
Q	R	R
R	S	Q
*S	S	S

b) Obtain the regular expression that denotes the language accepted by the following DFA, using Arden's Theorem: **[4]**



c) Give the formal definition for a Moore Machine, with a suitable example. **[2]**

UNIT - III

Q5) a) Give context free grammars for the following languages: **[6]**

i) $L = \{ a^n b^{2n} \mid n >= 0\}$

ii) $L = \{ 0^i 1^j 0^k \mid j > (i + k) \}$

b) Simplify the CFG given below, by eliminating all unit productions: **[4]**

S -> AB | bB

A -> a

B -> C | b

C -> D | bC | a

OR

Q6) a) Convert the given right-linear grammar to its equivalent left-linear form: **[6]**

S -> aA | bB

A -> bC

B -> aC

C -> aC | bC | a | b

b) Explain the closure properties of Context-free Languages (CFLs). **[4]**