Total No. of Questions : 6]

P4859

SEAT No. :

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T.E./Insem. - 146

T.E. (Computer Engg.)

TE INSEM AUG 2015

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} | n>=1}

Draw the finite automata for L.

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]**

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