5th Semester Regular / Back Examination 2015-16
THEORY OF COMPUTATION
BRANCH(S): CSE,IT
Time: 3 Hours
Max Marks: 70
Q.CODE: T672
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1   Answer the following questions: **(2 x 10)**
   a)   Define DFA and give one example.
   b)   Design a NFA that accepts all strings containing 1100 as
            substrings over $\sum = \{0,1\}$
   c)   What is the difference between Context Free Language and
            Context Sensitive Language?
   d)   Write a regular expression consisting of all strings consisting
            of   any number of 0's followed by any number of 1's over
            $\sum = \{0,1\}$

   e)   What is the difference between Moore and Mealy machine?

   f)   What do you mean by Left Linear Grammar and Right Linear
            Grammar?

   g)   Explain Arden's Theorem.

   h)   What do you mean by Ambiguity in CFG, explain with
            examples.
   i)   Find the DFA which accepts all strings containing odd
            numbers of 0's and 1's.
   j)   What is the difference between Turing machine and
            Pushdown Automata?

Q2 a) Design NFA which accepts set of all strings containing three   **(5)**
            consecutive zeros   . Also find the corresponding DFA.

   b)   Convert the r. e **r** = $(11+0)^*$ $(00+1)^*$ to NFA with   **(5)**
            $\in$ transition

Q3 **a)** Design DFA which accepts 1100 or 1010 only. **(5)**

b) Define Moore and Mealy Machine. For the given transition table Draw the transition diagram of Moore and find the corresponding Mealy Machine for the following Transition Table. **(5)**

States	Input		Output
	0	1	
q_0	q_0	q_1	0
q_1	q_0	q_2	0
q_2	q_0	q_2	1

Q4 **a)** Find a grammar in CNF equivalent to the Grammar :: **(5)**
S —› bA /aB,
A—›bAA /aS /a and
B—› aBB /bs /b

b) Let G= ({S,A},{a,b},P,S) where P :: S—› aAS / a /SS and A—› SbA / ba. **(5)**
Draw possible derivation tree(s) for the string **aabaa** using this grammar.

Q5. For the given Context Free Grammar G defined by **(10)**
S→AB/BC
A→BB/0
B→BA/1
C→AC/AA/0
Check whether the string **11010** belongs to G or not, by using Cocke Younger Kasami (CYK) algorithm.

Q6 **a)** What is PDA ? Construct an NPDA accepting the language **(5)**
$L = [\, w \, w^R \, | \, w \in \{a , b\}^* \,]$

b) Construct the Pushdown automata equivalent to the Grammar S→ aAA , A→as/bs/a . Also verify the result for the string **aabaaa.** **(5)**

Q7 **a)** Explain Linear Bounded Automata with the model. **(5)**

b) Design a Turing Machine that replaces all occurrences of '111' by '101' from the sequences of 0's and 1's **(5)**

Q8 Answer any Two of the followings : **(5 x 2)**

a) Explain Godel Numbering with examples.

b) Explain Ackermann's function. Find the value of A(1,y)

c) Explain Undecidability of Post correspondence problem.

d) Explain Chomsky classification of Grammar.