University of Technology
Computer Science Department
Class:Second Year
Time: 3 Hours

Subject:Computation Theory
Examiner:Suhad M. Kadhem

Final Exam /Second Trail / 2009 -2010

Note: Answer seven questions only.

Q1. If $\sum = \{a,b\}$, RE1= (a+b)((a+b)(a+b))* and RE2= a^+, find FA that accepts the language defined by: RE=RE1+RE2 by using *Kleen's theorem.* (10 Marks)

Q2. Build a *Turing machine* (TM) that accepts the language: $\{a^{2n}b^n a^{2n} : n>=0\}$ (10 Marks)

Q3. Build a *Mealy machine* that can increment the input by one, such as if your input is 1011 then the output will be 1100, then convert it to *Moore machine.* (10 Marks)

Q4. Convert the following CFG into CNF:

$S \rightarrow XaX$
$X \rightarrow ZY$
$Z \rightarrow abZ|\ baZ|\ ab|\ ba|\ Y$
$Y \rightarrow aa|\ bb|\ \Lambda$ (10 Marks)

Q5. Build a *pushdown automata* (PDA) for the following language:

$\{a^n\ b^{2n+2} : n>=0\}$ (10 Marks)

Q6. Find CFG for each of the following languages:

L1= $\{a^{2n}b^m a^{2n} : n>=0, m>=2\}$.

L2= $\{a^n b^m c^k : n>=0, m>=1, K=0,2,4,6,\ldots\}$ (10 Marks)

Q7. Find FA and RE that defines the same language accepted by the following CFG:

$S \rightarrow aA|\ bB$

$A \rightarrow aA|bB|\Lambda$

$B \rightarrow aB|\ bZ$

$Z \rightarrow aZ|\ bA$ (10 Marks)

Q8. Build *transition graph* (TG) that accepts all words that have different *first* and *last* letter, then find the RE and CFG for the same language. (10 Marks)