# CSC 360 FINAL EXAM

*Exam carries 30% of grade. Weight of each question is indicated next to the question.*. *Time Limit: 180 min*

# Name:

1. (2pts) Write a **regular expression** for the set of strings over

*{a, b}* which do not **begin** with ’ab’ **and** do not **end** with ’ab’.

1. (4pts) Give the state diagram of a DFA that accepts strings over *{*1*,* 2*,* 3*}* the sum of whose elements is divisible by 4.
2. (4pts) Construct a FA which accepts the language of the fol- lowing regular grammar.

*S → aA | bB A → aS | bC*

*B → bS | aC | λ C → aB | bA*

1. (4pts) Construct a grammar over *{a, b, c}* whose language is

*{a b c | n, m >* 0*}*

*n m* 2*n*+*m*

1. (4pts) What is the language of the following context free gram- mar?

*S → abSdc | A*

*A → cdAba | λ*

Give your answer in a set-theoretic definition (notation).

1. (4pts) Convert the following grammar into an equivalent gram- mar without any **left recursive rules**:

*S → A | C*

*A → AaB | AaC | B | a B → Bb | Cb*

*C → cC | c*

1. (4pts) Construct a PDA (push down automata) that accepts the following Context-Free language. Your answer must include state diagram of PDA.

*{aibjci | i, j ≥* 0*}*

1. (4pts) Use **Breadth-First-Bottom-Up** parsing algorithm to construct tree for the following string: **’((b))+b’**. Show all nodes of the tree generated by the algorithm. The grammar of the language is

*S → A*

*A → T*

*A → A* + *T*

*T → b*

*T →* (*A*)