

CS21004 Formal Languages and Automata Theory, Spring 2010–11

Class test 2

Maximum marks: 20

Date: April 11, 2011

Duration: 1 hour

Roll no: _____ Name: _____

[Write your answers in the question paper itself. Be brief and precise. Answer all questions.]

1. Consider the following language over $\Sigma = \{a, b, c\}$:

$$L_1 = \{a^i(bc)^j \mid i, j \geq 0 \text{ and } i \geq j\}.$$

- (a) Design a context-free grammar for L_1 . Briefly describe the substrings generated by the non-terminal symbols used in your grammar. (5)

- (b) Design a PDA $M = (Q, \Sigma, \Gamma, \delta, s, \perp, F)$ to accept L_1 . M must contain at most two states. Mention clearly whether your machine M accepts by final state or empty stack or both. (7)

2. Consider the following language over $\Sigma = \{a, b, c\}$:

$$L_2 = \{a^i b^j c^j \mid i, j \geq 0 \text{ and } i \geq j\}.$$

Prove that L_2 is not context-free.

(8)