Philadelphia University **Faculty of Information Technology**
Lecturer: Dr. Nameer N. EL-Emam **Department of CS**
Internal Examiner: Dr. Raad Alwan **Marking Scheme**

Course Name:Computation Theory Second Exam Semester one of the academic year: 750223 2014-2015
Date: 6/1/2015 Time one hour

Basic Part:

Objective: The aim of this part is to check student abilities of using PDA on CFL.

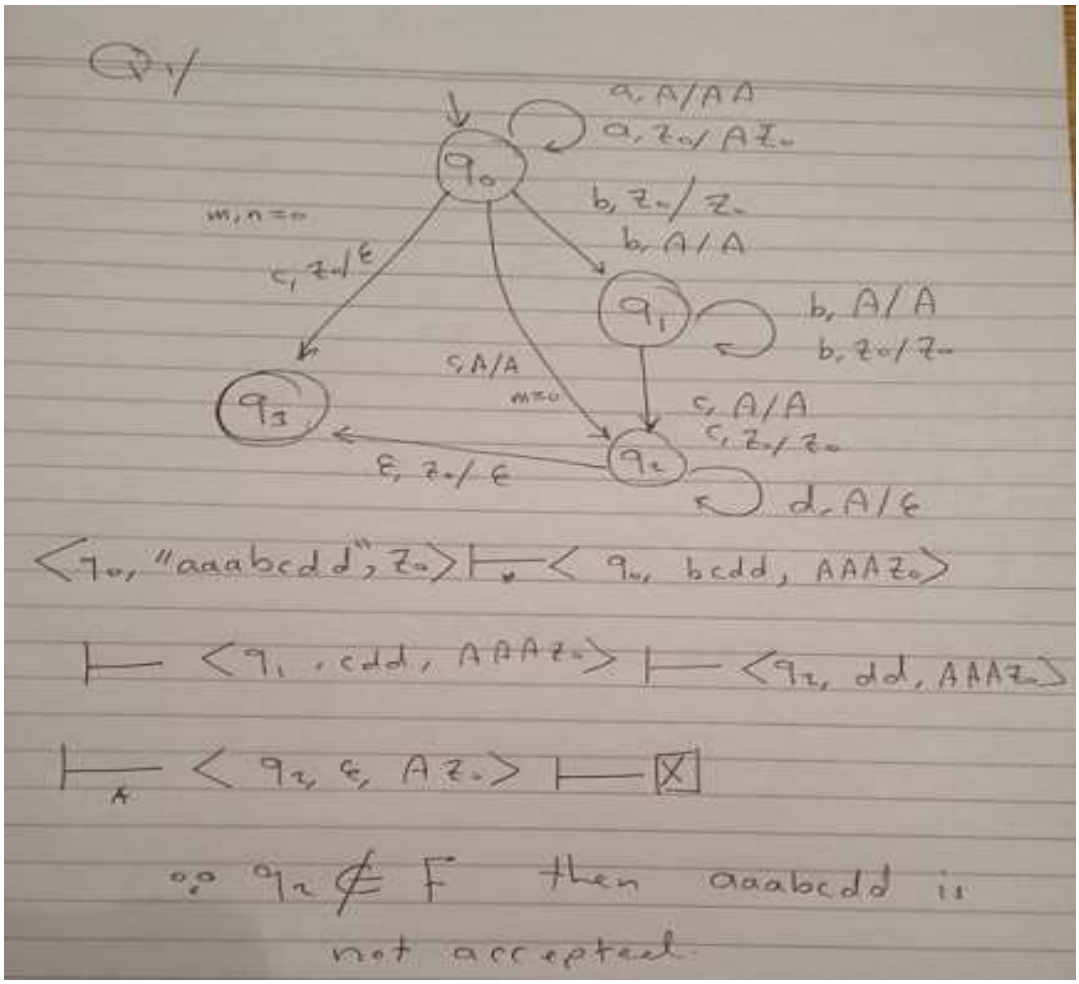
Q1/(6 marks) Assume that we have the language:

$$\mathbf{L} = \left\{ \mathbf{a^n b^m c\, d^n} \mid \mathbf{n,m \geq 0} \right\}.$$

Answer the following questions:

1) Give formal definition of PDA, where the formal machine of PDA acceptor have the 6-tuple $\langle Q , I , \Gamma , \delta , q_0 , F \rangle$.

2) Using configuration $\langle Q , I^* , \Gamma^* \rangle$ and binary relation " $\vdash$ " to check the string "**aaabcdd" is** accepted or rejected by **PDA.**



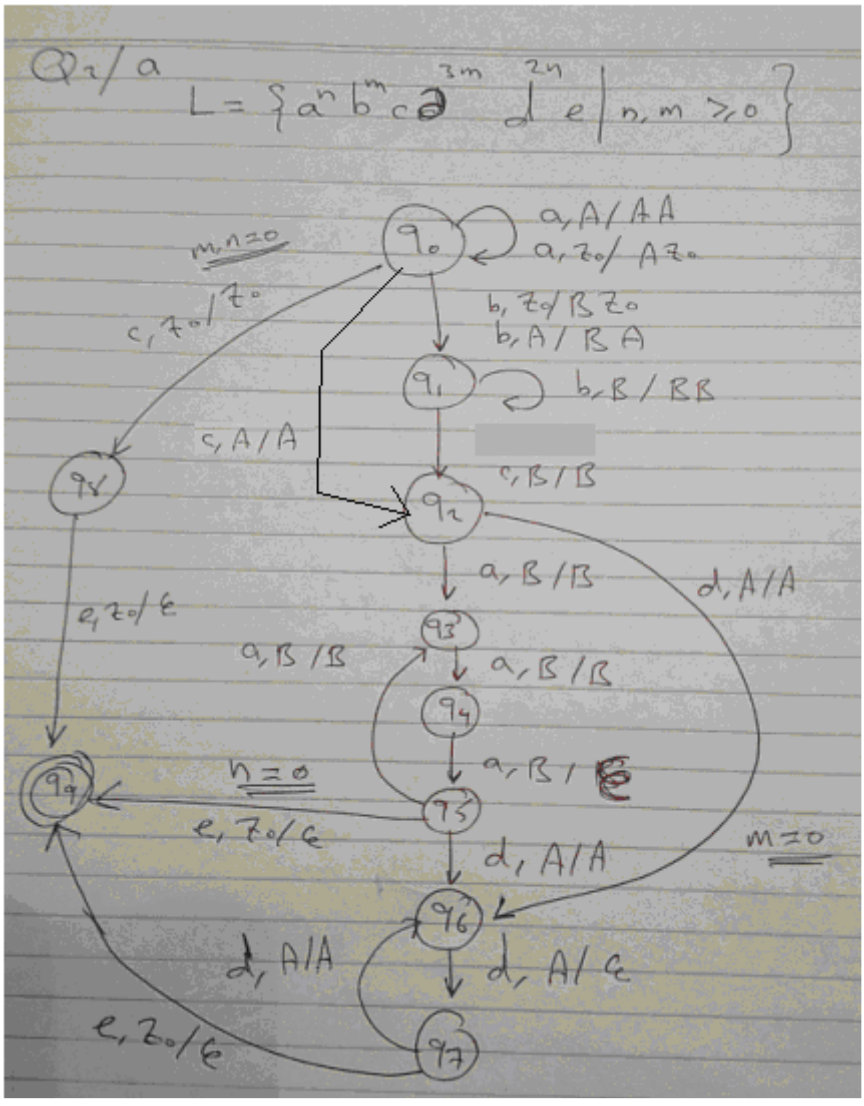
Familiar Part

Objective: The aim of this part is to check student abilities to use CFL to build the corresponding complex automata based on PDA.

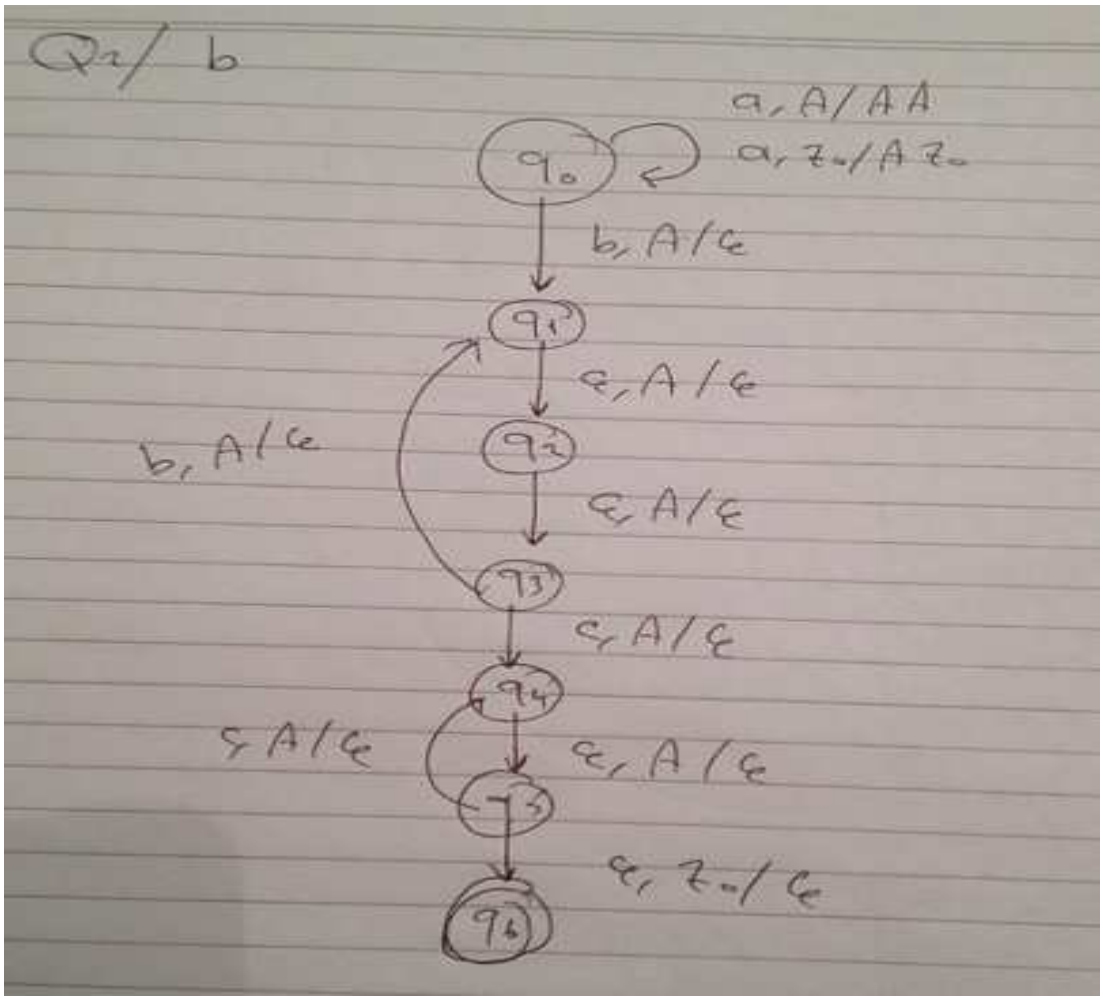
Q2/(8 marks)

Let us define the following context free languages **CFL:** Construct complex automata based on PDA as language acceptor with two levels symmetrical computation for each of the following languages, L1 and L2.

$$L1 = \left\{ a^n\ b^m\ c\ \left(d^{2n}\ a^{3m}\right)^r\ e \;\middle|\; \begin{array}{l} n,m \geq 0 \text{ and } r \text{ is} \\ \text{the reverse of the sequnce} \end{array} \right\}$$



$$L2 = \{ a^i b^k c^j \mid i = 2j + 3k \ , j,k > 0 \}$$

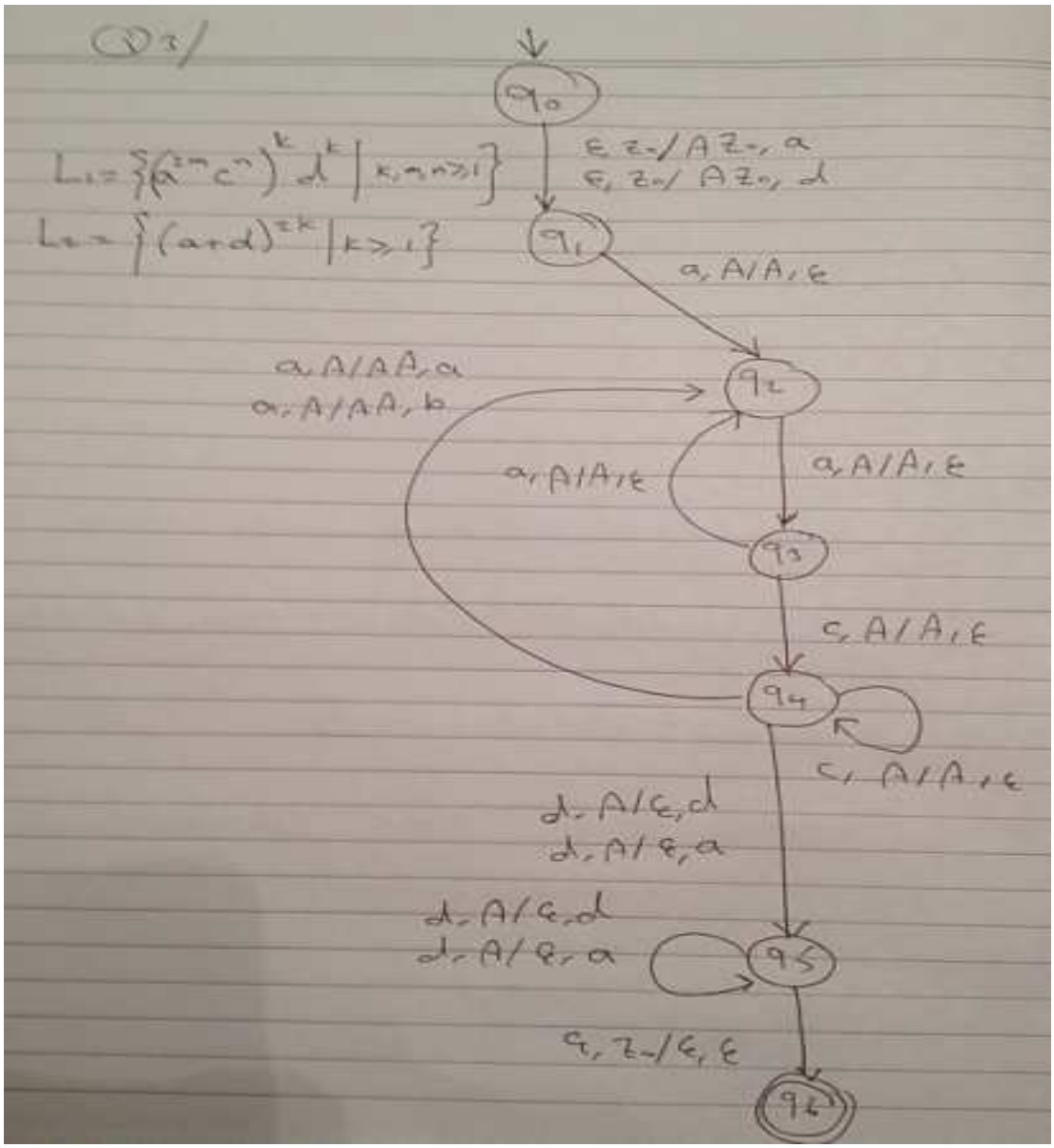


Unfamiliar part
Objective: The aim of this part is to check student capabilities to use two CFLs to build PDT.

Q3/(6 marks)
Construct PDT as language translator that accepts L1 to generate L2:

$$1 - L1 = \left\{ \left(a^{2m} \ c^n \right)^k \ d^k \mid n, m, k \geq 1 \right\}$$

$$2 - L2 = \left\{ (a + d)^{2k} \mid k \geq 1 \right\}$$


Q3/
$L_1 = \{(a^n c^n)^k d^k \mid k, n \geq 1\}$
$L_2 = \{(a+d)^{2k} \mid k \geq 1\}$
q_0
q_1
q_2
q_3
q_4
q_5
q_6
$\varepsilon, z_0 / A z_0, a$
$\varepsilon, z_0 / A z_0, d$
$a, A / A, \varepsilon$
$a, A / A A, a$
$a, A / A A, b$
$a, A / A, \varepsilon$
$a, A / A, \varepsilon$
$c, A / A, \varepsilon$
$c, A / A, \varepsilon$
$d, A / \varepsilon, d$
$d, A / \varepsilon, a$
$d, A / \varepsilon, d$
$d, A / \varepsilon, a$
$q, z_0 / \varepsilon, \varepsilon$