



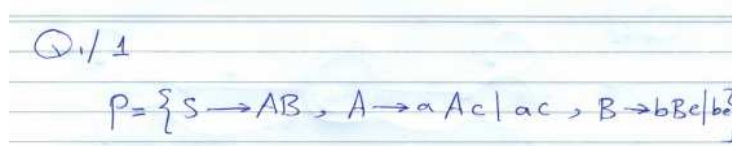
Basic Part

Objective: This part aims to check student abilities to construct CFG.

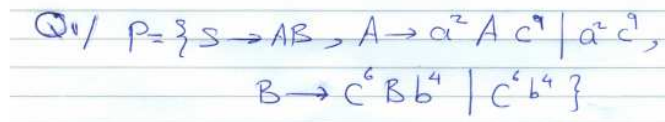
Q1/(10 marks)

Build context free grammar CFG for each of the following languages:

1. $L_1(G) = \{ a^m c^m b^n e^n \mid n, m \geq 1 \}$



2. $L_2(G) = \{ a^{2n} c^{3m} b^{4k} \mid m = 3n + 2k, n, k \geq 1 \}$



Familiar Part

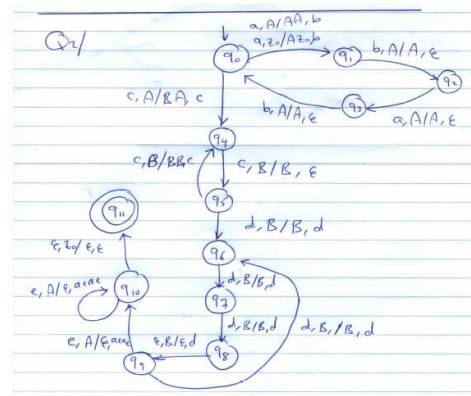
Objective: This part aims to check student abilities to construct PDAT and NFSA.

Q2/(10 marks)

Construct Push down automata as language translator PDAT for the following input and output CFLs:

The input language: $L_1(G) = \{ (ab)^{2m} c^{2n} d^{3n} e^m \mid n, m \geq 1 \}$

The output language: $L_2(G) = \{ b^m c^n d^{4n} (ae)^{2m} \mid n, m \geq 1 \}$

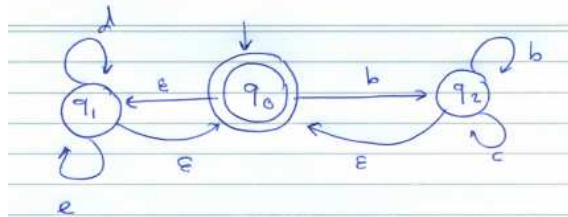


Objective: This part aims to check student abilities to construct NFSA if a regular expression is existed.

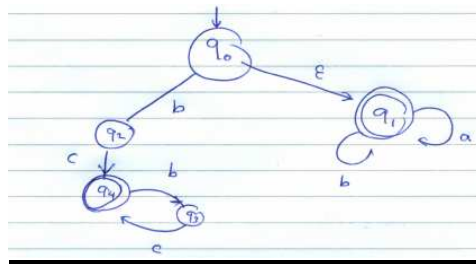
Q3/(10 marks)

Construct non-deterministic finite state automata (NFSA) to accept each of the following regular expressions:

1 – $(b (b + c)^* + (d + e)^*)^*$



2 – $(bc)^+ + (a+b)^*$



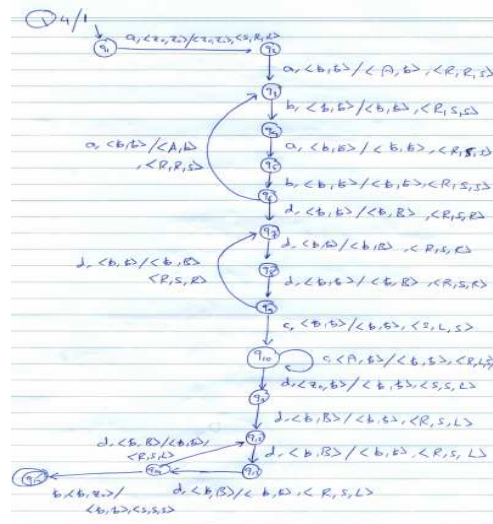
Unfamiliar part

Objective: This part aims to check student abilities to construct complex automata based on TM –acceptor working on Type 0 and Type 1 languages.

Q4/(10 marks)

Construct Turing machine as language acceptor for each of the following context sensitive languages:

1 – $L_1 = \{ (ab)^{2m} d^{3n} c^m d^{3n} \mid n, m \geq 1 \}$



$$2-L_2 = \{(a+b+c)^n \mid n \geq 1\}$$

