EXAMINATION SCRIPT

STUDENT NO.

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DEPARTMENT: 3 L-2 T-2

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BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY

DATE 16/1/2021

COURSE NO. CSE 211

COURSE TITLE Theory of Computation

SECTION B

Declaration on the Online Course Conduct by Undergraduate Student of BUET for COVID-19 Situation

Please write the declaration (as per no. 2 of 'Instructions' given in the footer) below in your own handwriting and sign it.

On my honour, I bearing Student No. 1705095 .... hereby declare that,

I shall not misuse, in any form or method, the course materials, Audio, and video Records of the lectures of this course. I shall not adopt any unfair means during the Final examination and shall not receive any help or offer/provide help to anyone. I shall preserve hard copy and soft copies of the answer scripts and will not expose the same to any person/party/media. I agree to accept any punitive measure taken by BUET authority if any time during or after the completion of the course it is revealed/vidated otherwise.

Signature.....Iftekhar Hakim Kaowsar..........

Date...16/1/2021...

Instructions

1. Clearly enter your Student ID, Course Number, Course Title, and Date in the space provided. *Complete the declaration exactly as below with your signature and date.* You can also insert the scanned image of your handwritten declaration in this box.

2. Declaration: I shall not misuse, in any form or method, the course materials including Lecture Notes, Reading Materials, Audio and Video Records of the lectures of this course. I shall not adopt any unfair means during the Final Examination and shall not receive any help or offer/ provide help to anyone. I shall preserve hard copy and soft copies of the answer scripts and will not expose the same to any person/party/media. I agree to accept any punitive measure taken by BUET Authority if at any time during or after the completion of the course it is revealed/ violated otherwise.

3. Do not put your name or any other form of identification except the Student No. anywhere in the answer script.

4. Use offset/normal white paper of A4 size for writing the answer. Use only one side of the paper for writing. On each page, clearly write your Student ID and Page numbers.

Ans. to q. no - 5

a) Let $G_1 = (V, \Sigma, R, S)$

Rules set R contains,

$$S \rightarrow A0A1A \mid A1A0A$$
$$A \rightarrow \epsilon \mid 0A \mid 1A$$

So, $V = \{S, A\}$

$\Sigma = \{0, 1\}$

b) Let $G_2 = (V, \Sigma, R, S)$

Rules set R contains,

$$S \rightarrow \epsilon \mid S0S1S \mid S1S0S$$

So, $V = \{S\}$.

$\Sigma = \{0, 1\}$

Ans. to - 6

Let the CFG be $G = (V, \not{B}\Sigma, R, S)$

Rules set R contains,

$$S \rightarrow S_1 \mid S_2$$
$$A \rightarrow ab \mid aAb$$
$$B \rightarrow cd \mid cBd$$
$$S_1 \rightarrow AB$$
$$C \rightarrow bc \mid bCc$$
$$D \rightarrow aCd \mid aDd$$
$$S_2 \rightarrow D$$

Here, variable set, $V = \{S, A, B, C, D\}$
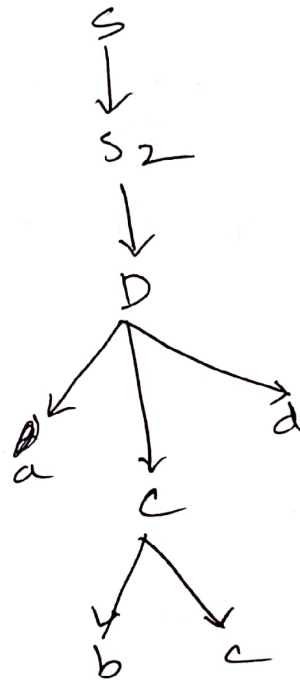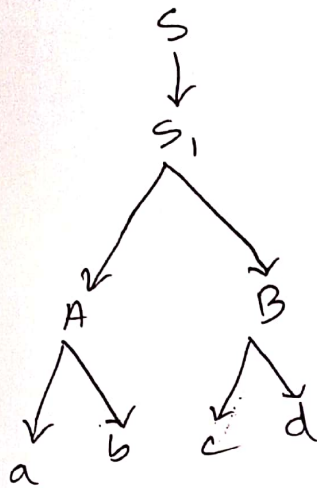
Alphabet, $\Sigma = \{a, b, c, d\}$

Rules set R given above.

Start variable is S.

We show it ambiguous by making

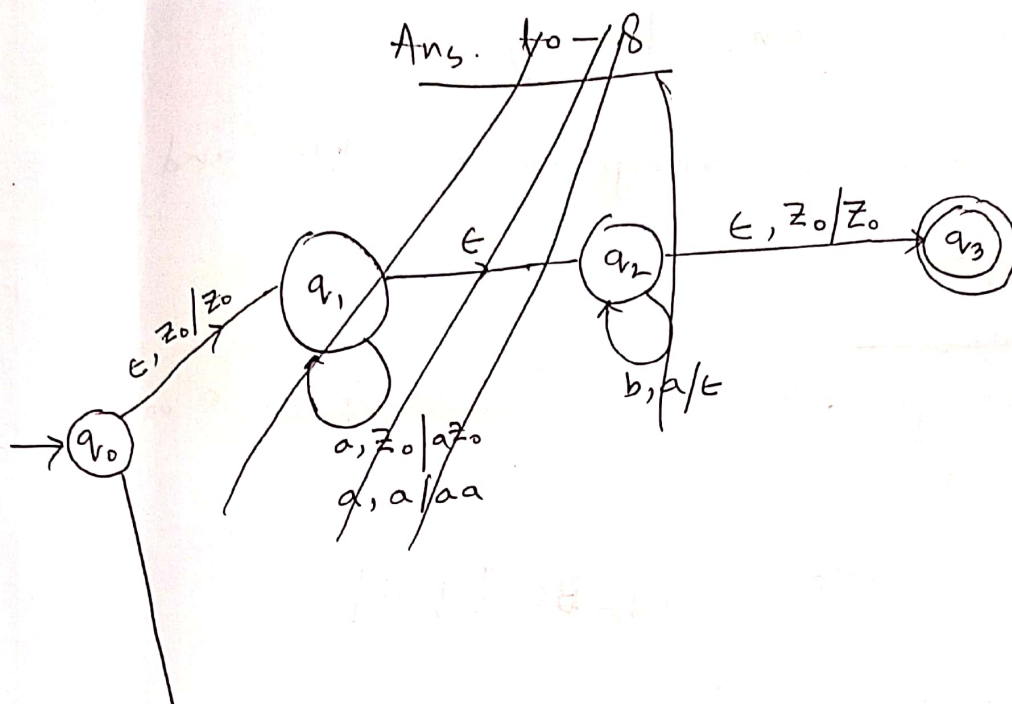2 parse trees for string, co=

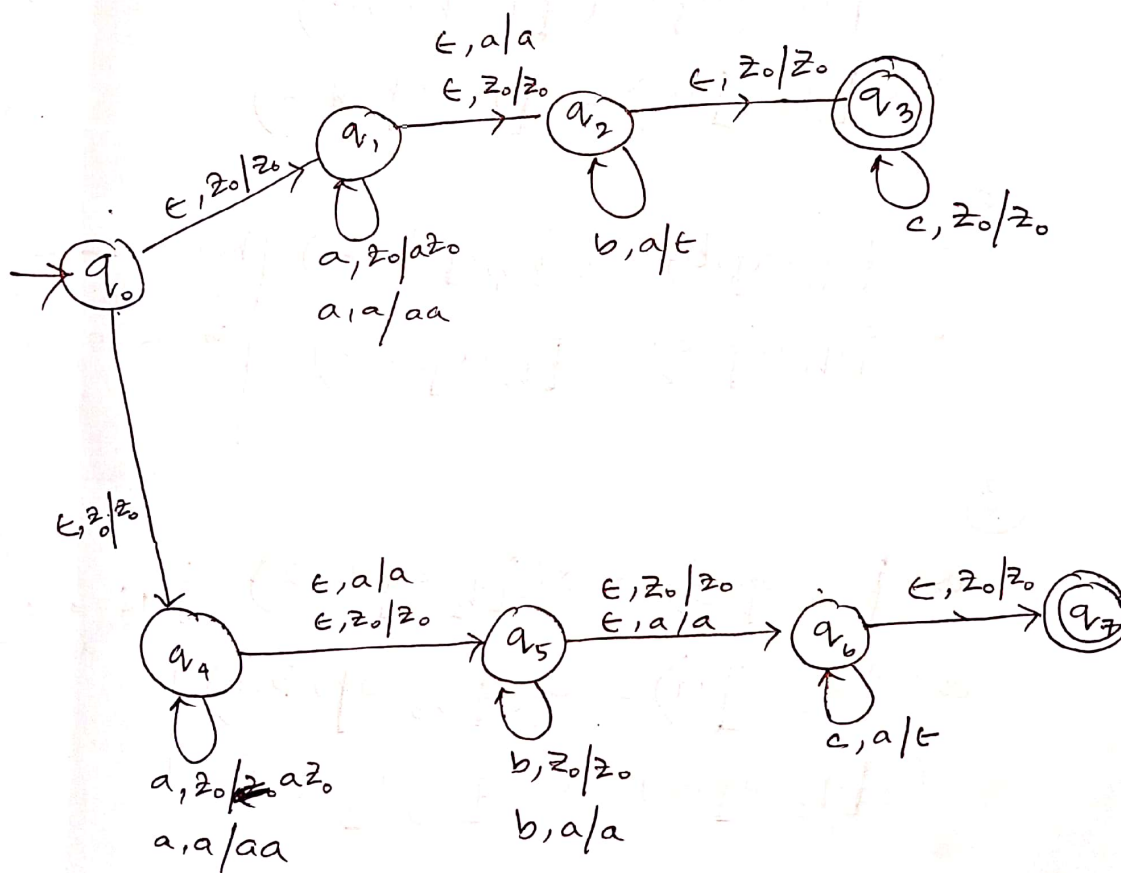abcd. It is surely in the language.

Two parse trees

Ans. to - 7

Running CYK algorithm. —

As the start symbol S is in cell x_{15}, given string is in $L(G)$.

Ans. to — 8

Ans to q. no — 8

Starting symbol for stack is z_0.

Ans. to - 9

We will use storage in the state and single track.

~~States of~~

Storage will contain ~~$\{0,1,B\}$~~ i.e. 0 or 1 or B.

start state is ~~$\{q_0,B\}$~~ $[q_0,B]$

Transitions —

① $\delta(\{q_0,B\},0) = (\{q_1,0\}, B, R)$

$\delta(\{q_0,B\},1) = (\{q_1,1\}, B, R)$

$\delta(\{q_0,B\},c) = (\{q_{done},B\}, B, R)$

② $\delta(\{q_1,a\},b) = (\{q_1,a\}, b, R)$ | here ~~a, b~~
  a is 0 or 1
$\delta(\{q_1,a\},c) = (\{q_2,a\}, c, R)$ | b is 0 or 1.

③

$\delta(\{q_2,a\},B) = \delta(\{q_2,a\}, B, R)$ | if $a=0, \bar{a}=1$
$\delta(\{q_2,a\},a) = \delta(\{q_3,0\}, B, R)$ | $a=1, \bar{a}=0$
$\delta(\{q_2,a\},\bar{a}) = \delta(\{q_3,1\}, B, R)$

④

$$\delta(\{q_3, a\}, b) = (\{q_3, a\}, b, R)$$

$$\delta(\{q_3, a\}, c) = (\{q_4, a\}, c, R)$$

⑤

$$\delta(\{q_4, a\}, b) = (\{q_4, a\}, b, R)$$

$$\delta(\{q_4, a\}, B) = (\{q_5, B\}, a, L)$$

⑥

$$\delta(\{q_5, B\}, a) = (\{q_5, B\}, a, L)$$

$$\delta(\{q_5, B\}, c) = (\{q_6, B\}, c, L)$$

$$\delta(\{q_5$$

⑦

$$\delta(\{q_6, B\}, a) = (\{q_6, B\}, a, L)$$

$$\delta(\{q_6, B\}, B) = (\{q_6, B\}, B, L)$$

$$\delta(\{q_6, B\}, c) = (\{q_7, B\}, c, L)$$

⑧

$$\delta(\{q_7, B\}, a) = (\{q_7, B\}, a, L)$$

$$\delta(\{q_7, B\}, B) = (\{q_0, B\}, B, R)$$

So, states are,

~~{q_0, B}, {q_1, 0}, {q_1, 1}, {q_2~~

[q_0, B], [q_1, 0], [q_1, 1], [q_2, 0], [q_2, 1],

[q_3, 0], [q_3, 1], [q_4, 0], [q_4, 1], [q_5, B],

[q_6, B], [q_7, B], [q_{done}, B]