

Pulak Deb Roy

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Sec - 10

Q-1 2-10

(a)  $(ab^* + \#a)^* + b \rightarrow S$  (a)

~~$S \rightarrow A + B$~~

~~$A \rightarrow aAb + \#aA + \epsilon$~~

~~$B \rightarrow b$~~

$A \rightarrow \underbrace{ab^*}_P + \underbrace{\#a}_R$

$\hookrightarrow \overset{S}{AS} | \epsilon | Q$

$P \rightarrow bP | \epsilon$  ( $0 \leq n$  or  $n \geq 0 \rightarrow \{0, 1, 2, \dots\} = \omega$ ) (a)

$R \rightarrow \#a$

$Q \rightarrow b$

~~$A \rightarrow P + R$~~

$$(b) \textcircled{i} S \rightarrow ASA / b$$

$$A \rightarrow bb$$

$$\rightarrow ASA$$

$$\rightarrow bbsA$$

$$\rightarrow bbbA$$

$$\rightarrow bbbb$$

$\therefore$  Prove  $L_1$

$$\textcircled{ii} S \rightarrow AAAAAS / \epsilon$$

$$A \rightarrow bA / b$$

$$S$$

$$\rightarrow AAAAAS$$

$$\rightarrow bAAAAA$$

$$\rightarrow bbbAAAA$$

$$\rightarrow bbbbAAA$$

$$\rightarrow bbbbbAA$$

$$\rightarrow bbbbbbA$$

$$\rightarrow bbbbbbb$$

$\therefore$  Prove  $L_1$

$$\textcircled{iii} S \rightarrow AASB / \epsilon$$

$$A \rightarrow bb$$

$$B \rightarrow b$$

$$S$$

$$\rightarrow AASB$$

$$\rightarrow bbbASB$$

$$\rightarrow bbbbASB$$

$$\rightarrow bbbbbbB$$

$$\rightarrow bbbbbbb$$

$\therefore$  Prove  $L_1$

(iv)  $S \rightarrow bP \mid bbb b Q \mid \epsilon$

$P \rightarrow b b R$

$R \rightarrow b Q$

$Q \rightarrow b S$

$A \rightarrow d d d \epsilon$

$A \rightarrow d d d \epsilon \rightarrow b P$

$d d d d d \epsilon \rightarrow b b b R$

$\rightarrow b b b b Q$

$\therefore$  Prove  $L1: A A A A A \rightarrow b b b b b S$

$2 A A A A A \rightarrow b b b b b$

$\therefore$  all four CFCs are connect.

(Any)

(c)  $bbbbb \# aa$

(d)  $S' \rightarrow SP$

$S \rightarrow ASA \mid b$

$A \rightarrow bb$

$P \rightarrow \# Q$

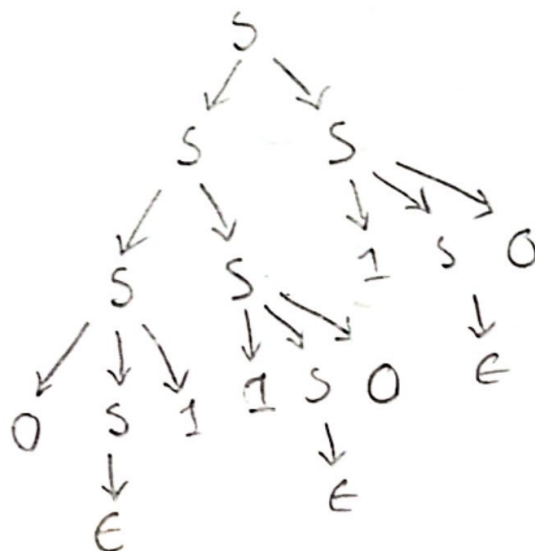
$Q \rightarrow a Q \mid a$

Qus - 2

(a) 0 1 1 0 1 0

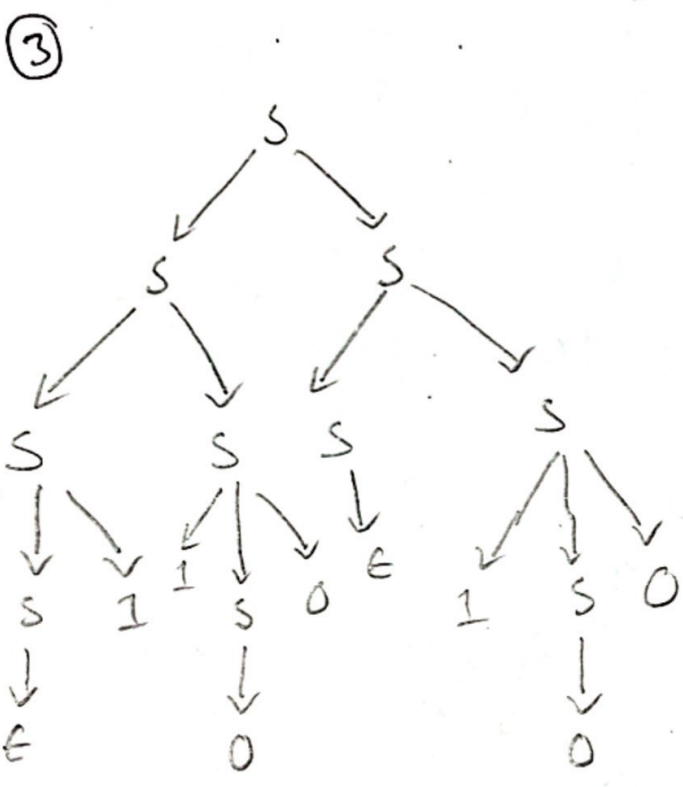
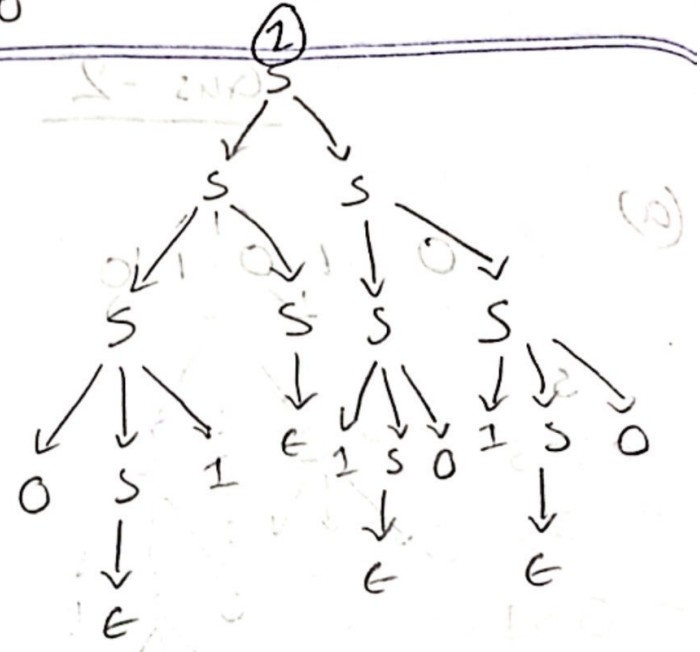
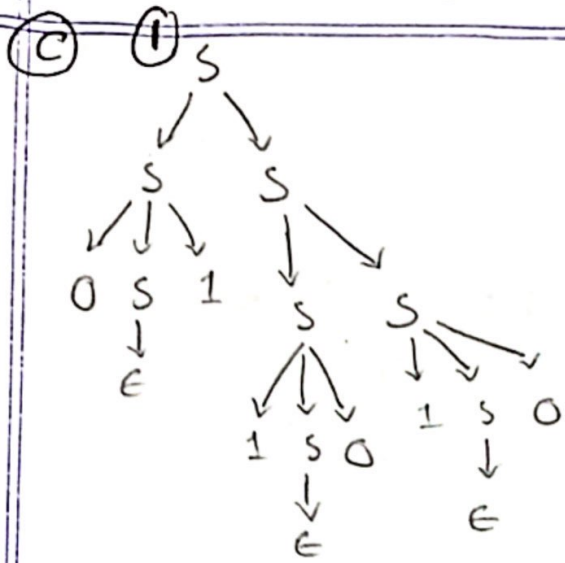
S  
→ S S  
→ S S S  
→ 0 S 1 S S  
→ 0 1 S 1 S  
→ 0 1 1 S 0 S  
→ 0 1 1 0 S  
→ 0 1 1 0 1 S 0  
→ 0 1 1 0 1 0

(b)





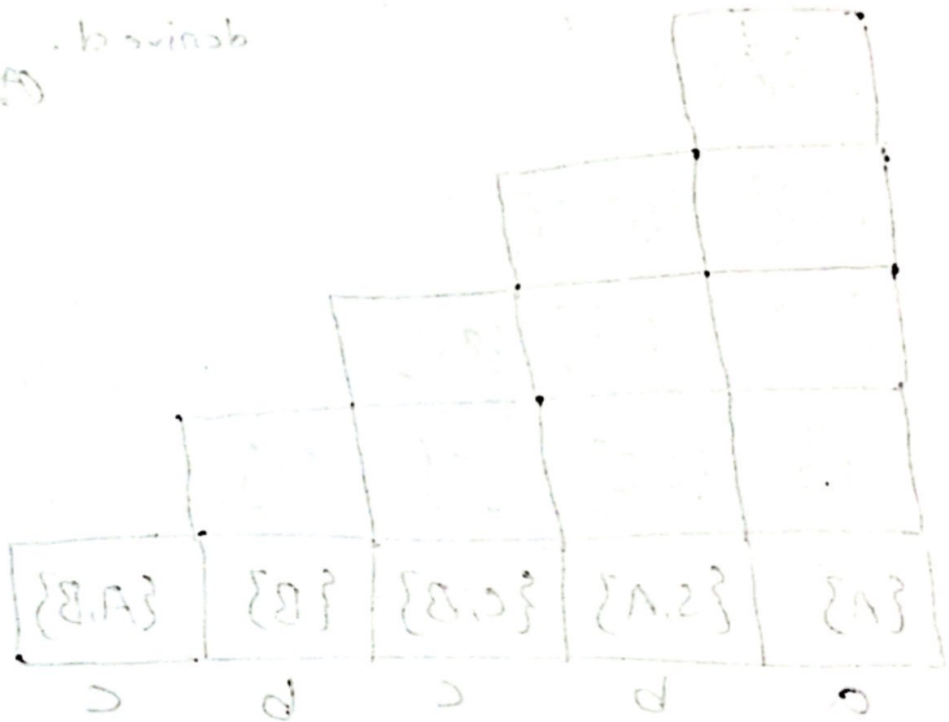
011010



(d) String - 0001111

ed was printed out :  
 . to finish  
 (1000)

(e)

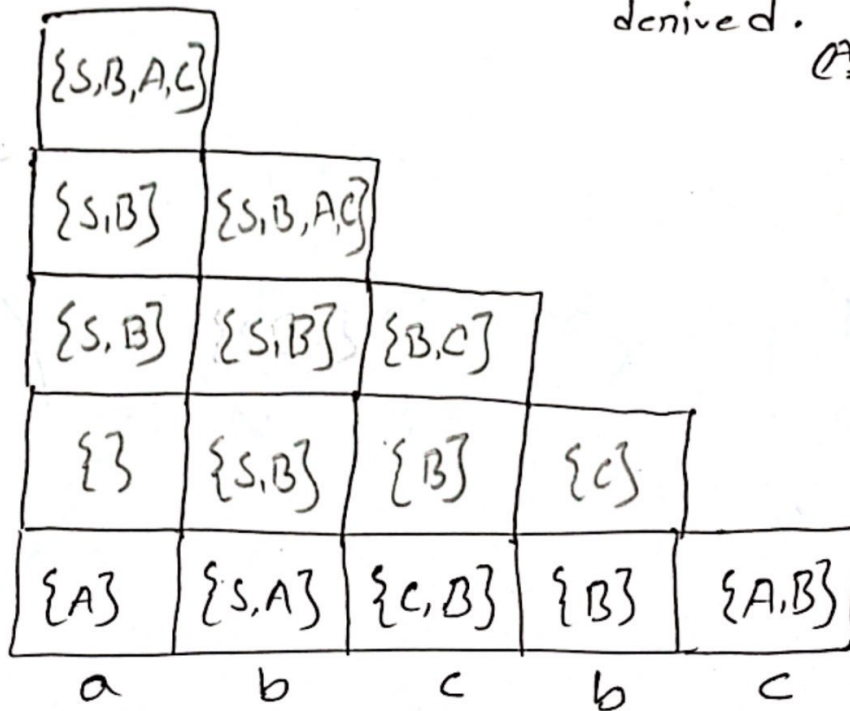


Q-3

$\{AS, AB, AA, AC\} \cup \{SC, BC\} \cup$   
 $\{SA, SB, BA, BB\}$

$\therefore$  The string can be derived.

Ans



~~{AS, AA}~~

~~{SC, SB, AC, AB}~~

~~{CB, BB}~~

~~{BA, BB}~~

$\{AS, AB\} \cup \{SB, BB\}$

$\{SB, SC, AB, AC\} \cup \{SC, BC\} \cup \{SA, SB, BA, BB\}$

$\{AS, AB\}$

$\{SB, AB\} \cup \{SB, BB\}$

$\{SC, CB\} \cup \{BA, BB\}$



Q-4

(a)  $S \rightarrow \epsilon$   
 $A \rightarrow \epsilon$   
 $B \rightarrow Bb$   
 $B \rightarrow AaB$

(b)  $S \rightarrow xaxbX / x$   
 $X \rightarrow aAX / \epsilon$   
 $A \rightarrow AA / a$

if  $X \rightarrow \epsilon$  eliminated;

$$S \rightarrow xaxbX / \epsilon / aXbX / xabX / xaxb / abX / xa$$
$$X \rightarrow aAX / aA$$
$$A \rightarrow AA / a$$

(C)

$$S \rightarrow AB \mid CA$$

$$A \rightarrow \textcircled{C} \mid BA \mid a$$

$$B \rightarrow Aba \mid Bbb \mid Ca$$

$$C \rightarrow AB \mid AC \mid \textcircled{A}$$

$$S \rightarrow AB \mid CA$$

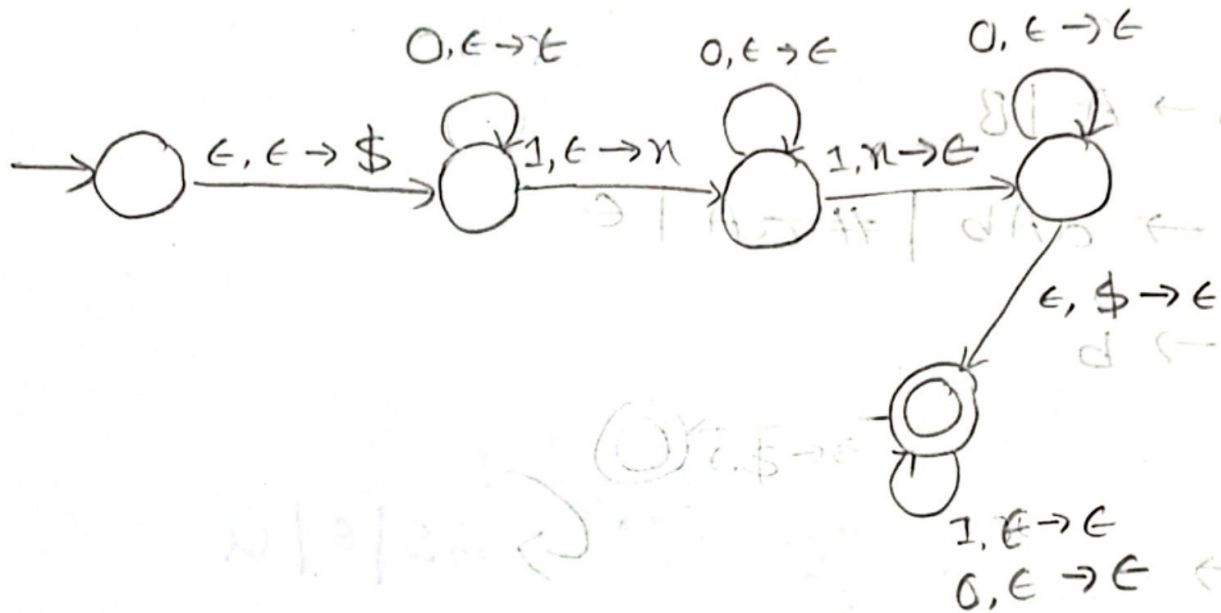
$$A \rightarrow AB \mid AC \mid BA \mid a$$

$$B \rightarrow Aba \mid Bbb \mid Ca$$

$$C \rightarrow AB \mid AC \mid BA$$

Q-5

(a)  $L_1 = \{w \text{ contains at least two } 1\}$



(b)  $L_2 = \{w = (10)^n 1^{2n} \text{ where } n \geq 0\}$

