

Q1: what is POP stack and draw its diagram.

Answer:- Rep

Q6 : Consider the following CFG

S $\rightarrow aXb|bXa$

$XaX|bX$

What does it mean?

Answer:- (Page 91)

The above CFG generates the language of strings, defined over $\Sigma = \{a,b\}$, beginning and ending in different letters.

Q7: Explain Distinguishable strings and Indistinguishable strings?

Answer:- (Page 53)

Distinguishable strings and Indistinguishable strings

Two strings x and y , belonging to Σ^* , are said to be **distinguishable** w.r.t a language $L \subseteq \Sigma^*$ if there exists a string z belonging to Σ^* s.t. $xz \in L$ but $yz \notin L$ or $xz \notin L$ but $yz \in L$.

Two strings x and y , belonging to Σ^* , are said to be **indistinguishable** with respect to a language $L \subseteq \Sigma^*$ if for every string z belonging to Σ^* , either both xz or $yz \in L$ or both don't belong to L .

جو شخص ناکامیوں سے ڈر کر بھاگتا ہے کامیابی اُس سے ڈر کر بھاگتی ہے

1. What is Row Language?

Answer:- (Page 123)

Row language whose alphabet is $\Sigma = \{\text{Row1, Row2, } \dots, \text{Row7}\}$ i.e. the alphabet consists of the letters which are the names of the rows in the summary table.

2. What does FA stands for?

Answer:- (Page 11)

Finite Automaton

3. What are live and dead productions.

Answer:- (Page 123)

Live production: A production of the form nonterminal $\rightarrow$ string of two nonterminals is called a live production.

Dead production: A production of the form nonterminal $\rightarrow$ terminal is called a dead production.

4. What do you mean by wanted and unwanted branches?

Answer:- (Page 137)

wanted branches (the branches that lead to the required word)

unwanted branches (the branches that don't lead to the required word)

5. Given the CFG, had to write the language (EQUAL)

Answer:- (Page)

$\Sigma = \{a, b\}$

productions:

$S \rightarrow aB$

$S \rightarrow bA$

$A \rightarrow a$

$A \rightarrow aS$

$A \rightarrow bAA$

$B \rightarrow b$

$B \rightarrow bS$

$B \rightarrow aBB$

This grammar generates the language EQUAL (The language of strings, with number of a's equal to number of b's).

جو لوگوں کے سامنے فخر کرتا ہے وہ لوگوں کی نظروں سے گرجاتا ہے

6. Construct corresponding CFG for the given language

(1) All words of even length but not multiple of 3.

Answer(page 90)

Example

$\Sigma = \{a,b\}$

productions:

$S \rightarrow SS$

$S \rightarrow XS$

$S \rightarrow \Lambda$

$S \rightarrow YSY$

$X \rightarrow aa$

$X \rightarrow bb$

$Y \rightarrow ab$

$Y \rightarrow ba$

This grammar generates EVEN'EVEN language.

(2) Palindrome (both even and odd palindrome). (5 mark)

Answer(page 91)

Example

The CFG for odd length of Palindrom is given as:

$S \rightarrow aSa \mid bSb \mid a \mid b$

The CFG for even length of Palindrom is given as:

$S \rightarrow aSa \mid bSb \mid aa \mid bb \mid \Lambda$

7. Who invented Turing m/c

Answer:- (Page 140)

Alan Mathison Turing developed the machines called Turing machines.

8. Equivalent /non-equivalent languages

Answer:- (Page 80)

Determining whether the two languages are equivalent or not ?

If L_1 and L_2 are two regular languages, then they can be expressed by FAs. As shown earlier, L_1^c , L_2^c , $L_1 \cup L_2$, $L_1 \cap L_2$ are regular languages and the methods have already been developed to build their corresponding FAs. It can be observed that $(L_1 \cap L_2^c) \cup (L_1^c \cap L_2)$ is regular language that accepts the words which are in L_1 but not in L_2 or else in L_2 but not in L_1 . The corresponding FA cannot accept any word which is in both L_1 and L_2 i.e. if L_1 and L_2 are equivalent, then this FA accepts not even null string. Following are the methods that determine whether a given FA accepts any words

عقل مند اپنے عیب خود دیکھتا ہے اور بچہ قوفوں کے عیب دنیا دیکھتی ہے

9. What are formal languages?

Answer:- (Page 3)

Formal Languages are Syntactic languages.

What is Transition?

Answer:- (Page 11)

Transition showing how to move from one state to another.

Alternative form of this production

$\Sigma = \{a,b\}$

productions:

$S \rightarrow aS \mid bS \mid a \mid b \mid \Lambda$

Answer:- (Page 88)

This grammar also defines the language expressed by $(a+b)^*$.

What is input Tap?

Answer:- (Page 105)

The part of an FA, where the input string is placed before it is run, is called the input TAPE.

The input TAPE is supposed to accommodate all possible strings. The input TAPE is partitioned with cells, so that each letter of the input string can be placed in each cell.

What is live production?

Answer:- Rep

Differentiate between Distinguishable and Indistinguishable strings.

Answer:- Rep

What is wanted and unwanted branches

Answer:- Rep

What is unit of production?

Answer:- Rep

بد صورت چہرہ بد صورت دماغ سے بہتر ہے

Define two rules(Row Language.).

Answer:- (Page 125)

Following are the three rules of defining all possible productions of CFG of the row language
 The trip starting from START state and ending in ACCEPT state with the NET style
 Net(START, ACCEPT, \$) gives the production of the form $S \rightarrow \text{Net(START, ACCEPT, \$)}$

$(L_1 \cup L_2^c)$ intersection $(L_1^c \cup L_2)$ the language or accept any thing or not...

Answer:- (Page 80)

$(L_1 \cap L_2^c) \cup (L_1^c \cap L_2)$ is regular language that accepts the words which are in L_1 but not in L_2 or else in L_2 but not in L_1 .

ambiguous grammar,

Answer:- (Page 95)

The CFG is said to be ambiguous if there exists atleast one word of it's language that can be generated by the different production trees.

Difference between semi-word and word with example?

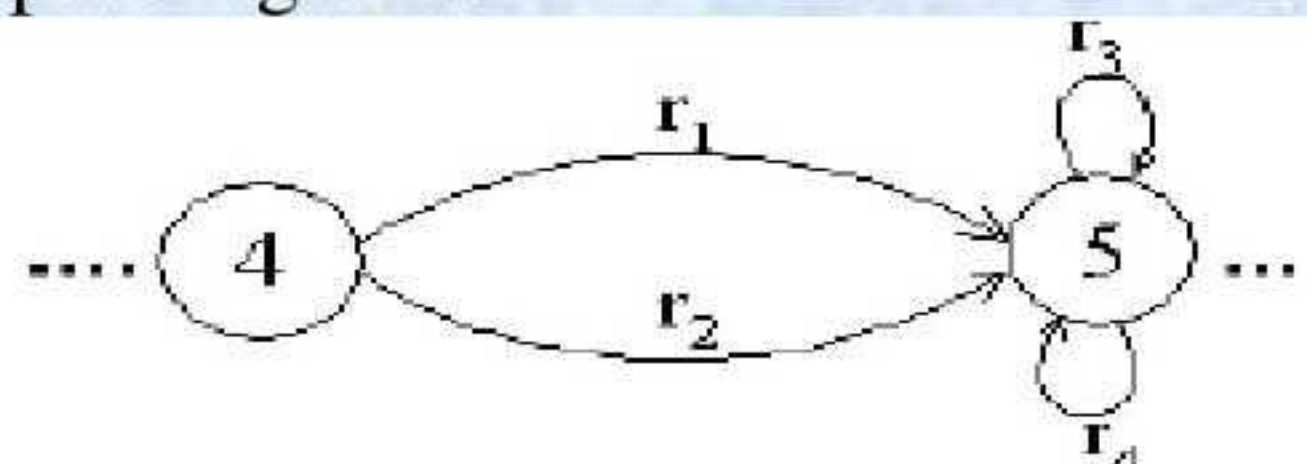
Answer:- Rep

If there are more than one edges between two states then we can replace them by one edge in a TG. Explain it with examples?

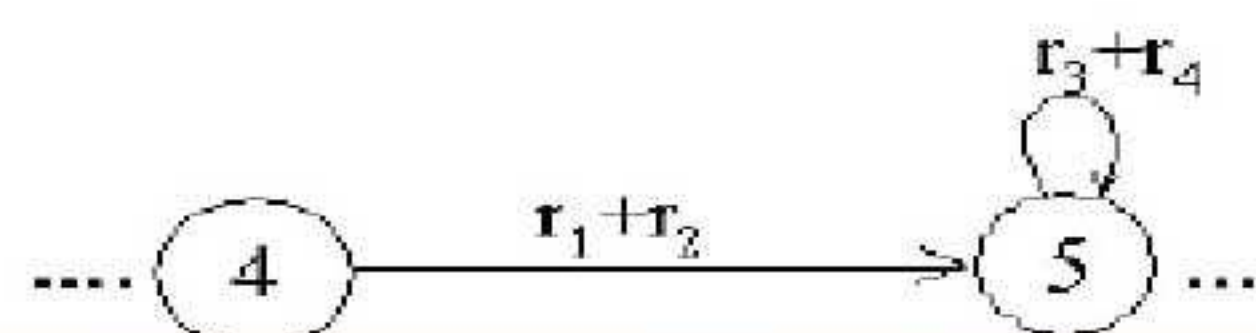
Answer:- (Page 27)

If a state has two (more than one) incoming transition edges labeled by the corresponding REs, from the same state (including the possibility of loops at a state), then replace all these transition edges with a single transition edge labeled by the sum of corresponding REs.

Example



The above TG can be reduced to



عقل مند آدمی اس وقت تک نہیں بولتا جب تک خاموشی نہیں ہو جاتی

How can you say that two FAs are equivalent?

Answer:- (Page 15)

It is to be noted that two FAs are said to be equivalent, if they accept the same language

What is a production?

Answer: - (Page 87)

Productions: The grammatical rules are often called productions.

two different method for converting the NFA to FA 5marks

Answer: - (Page 43)

Method 1: Since an NFA can be considered to be a TG as well, so a RE corresponding to the given NFA can be determined (using Kleene's theorem). Again using the methods discussed in the proof of Kleene's theorem, an FA can be built corresponding to that RE. Hence for a given NFA, an FA can be built equivalent to the NFA

Method 2: Since in an NFA, there may be more than one transition for a certain letter and there may not be any transition for certain letter, so starting from the initial state corresponding to the initial state of given NFA, the transition diagram of the corresponding FA, can be built introducing an empty state for a letter having no transition at certain state and a state corresponding to the combination of states, for a letter having more than one transitions

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Explain the decidability and examples. 5marks

Answer: - (Page 80)

Decidability

Effectively solvable problem

A problem is said to be effectively solvable if there exists an algorithm that provides the solution in finite number of steps e.g. finding solution for quadratic equation is effectively solvable problem, because the quadratic formula provides an algorithm that determines the solution in a finite number of arithmetic operations, (four multiplications, two subtractions, one square root and one division).

similarity and dif b/w DFA and NFA 3 marks

Answer: - Rep

RE for Even-even 2 marks

Answer: - (Page 10)

$(aa+bb+(ab+ba)(aa+bb)^*(ab+ba))^*$