بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

In the Name of Allāh, the Most Gracious, the Most Merciful

Paper Pattern

MCQS 40 each 1 mark
Short 4 each 2 marks
Short 4 each 3 marks
long 4 each 5 marks

Question No : 1 of 52 Marks: 1 (Budgeted Time 1 Min)

Which statement is true?

pg 4

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Answer (Please select your correct option)

- All words are strings
- All strings are words
- Both are always same
- All letter are string

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Question No : 2 of 52 Marks: 1 (Budgeted Time 1 Min)

If L1 and L2 are expressed by r1 and r2, respectively then the language expressed by (r1)(r2) will be _____

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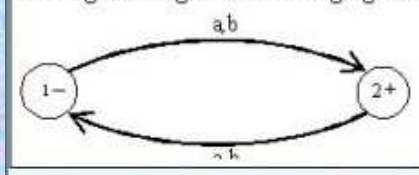
Answer (Please select your correct option)

- Regular
- Ir-regular
- Undermined
- Such language does not exist

Made by: Waqar Siddhu

Question No : 3 of 52 Marks: 1 (Budgeted Time 1 Min)

Below given FA generates the language having strings of _____



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Answer (Please select your correct option)

- ODD length
- EVEN length
- Equal number of a's and b's
- Odd number of a's and b's

Made by: Waqar Siddhu

Question No : 4 of 52 Marks: 1 (Budgeted Time 1 Min)

If an FA accepts no string, then language is denoted by _____

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Answer (Please select your correct option)

- {}
- Ø
- Both { } and Ø
- Null

Made by: Waqar Siddhu

Question No : 5 of 52 Marks: 1 (Budgeted Time 1 Min)

Using tree structure, initial state can be represented by____

pg 16 bk

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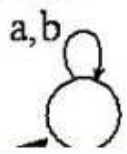
Answer (Please select your correct option)

- An arrow
- +
- -
- *

Made by: Waqar Siddhu

Question No : 6 of 52 Marks: 1 (Budgeted Time 1 Min)

Below given FA accepts _____ language.



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Answer (Please select your correct option)

- Finite
- Infinite
- No
- All

Made by: Waqar Siddhu

Question No : 7 of 52 Marks: 1 (Budgeted Time 1 Min)

Even-palindrome is a _____ language

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Answer (Please select your correct option)

- non-regular
- regular
- regular but infinite
- regular but finite

Made by: Waqar Siddhu

Question No : 8 of 52 Marks: 1 (Budgeted Time 1 Min)

If L1 and L2 are two regular languages, then _____ is/are also regular.

pg 63 & 66 of bk

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Answer (Please select your correct option)

- Both $L1 \cup L2$, $L1 \cap L2$
- $L1^c \cap L2$
- $L1 \cup L2$
- $L1 \cap L2$

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Question No : 9 of 52 Marks: 1 (Budgeted Time 1 Min)

Consider the language L of strings, defined over Σ = {a,b}, ending in a

pg 74 bk

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Answer (Please select your correct option)

- There are finite many classes generated by L, so L is regular
- There are infinite many classes generated by L, so L is regular
- There are finite many classes generated by L, so L is non-regular
- There are infinite many classes generated by L, so L is non-regular

Made by: Waqar Siddhu

Question No : 10 of 52 Marks: 1 (Budgeted Time 1 Min)

Pumping lemma is generally used to prove that:

pg 72

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Answer (Please select your correct option)

- A given language is infinite
- A given language is not regular
- Whether two given regular expressions of a regular language are equivalent or not
- A given language is finite

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Question No : 11 of 52 Marks: 1 (Budgeted Time 1 Min)

If the FA has N states, then test the words of length less than N. If any one word is accepted by this FA, then it will accept ____ word.

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Answer (Please select your correct option)

- All — not sure
- No
- One
- Two

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Question No : 12 of 52 Marks: 1 (Budgeted Time 1 Min)

Which of the following pairs of regular expressions are equivalent?

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Answer (Please select your correct option)

- 1(001)* and (10)*10
- x(xx)* and (x)*x
- x^+ and x*
- x^+ and x^*x^+

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Question No : 13 of 52 Marks: 1 (Budgeted Time 1 Min)

Which of the following pairs of regular expressions are not equivalent?

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Answer (Please select your correct option)

- (ab)* and a*b*
- x(xx)* and (xx)*x
- x^+ and x^*x^+
- x(x)* and (x)*x

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Question No : 14 of 52 Marks: 1 (Budgeted Time 1 Min)

Which of the following statement is correct?

pg 54

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Answer (Please select your correct option)

- The length of output string is greater than length of input string in moore machine.
- The length of output string is greater than length of input string in mealy machine.
- The length of output string is equal to length of input string in moore machine.
- The length of output string is less than length of input string in mealy machine.

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Question No : 15 of 52 Marks: 1 (Budgeted Time 1 Min)

There exist _____ derivations of a certain word in ambiguous grammar.

pg 95

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Answer (Please select your correct option)

- more than one
- Exactly one
- exactly two
- no

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Question No : 16 of 52 Marks: 1 (Budgeted Time 1 Min)

Which one of the following statements is INCORRECT:

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Answer (Please select your correct option)

- (a+b)*aa(a+b)* generates Regular language.
- A language consisting of all strings over ∑={a,b} having equal number of a's and b's is a regular language
- Every language that can be expressed by FA can also be expressed by RE
- None of these

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Question No : 17 of 52 Marks: 1 (Budgeted Time 1 Min)

We can also represent an FA using different states e.g. Accept state, Reject state, Read State etc.
The _____ state behaves as final state of an FA.

pg 105

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Answer (Please select your correct option)

- Accept
- Pop
- Push
- Reject

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Question No : 18 of 52 Marks: 1 (Budgeted Time 1 Min)

CYK algorithm was invented by John Cocke and later was published by ____

pg 134

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Answer (Please select your correct option)

- Talik Khon and Daniel H
- Tandao Kasami and Daniel H
- Tandao Dagger and Daniel H
- Talik Khon

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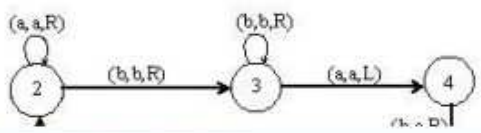
Question No : 19 of 52 Marks: 1 (Budgeted Time 1 Min)

Consider the following TM



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Answer (Please select your correct option)

- Above TM accepts the non-CFL {a b c}.
- Above TM accepts the non-CFL $\{a^n b^n a^n\}$.
- Above TM accepts the non-CFL $\{a^n b^{n+2} a^n\}$.
- Above TM accepts the non-CFL $\{a^{n+2} b^n a^n\}$.

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Question No : 20 of 52 Marks: 1 (Budgeted Time 1 Min)

Σ= (a,b) then string abbabb has length equal to _____.

pg 4

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Answer (Please select your correct option)

- Three
- Four
- Five
- Six

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Question No : 21 of 52 Marks: 1 (Budgeted Time 1 Min)

The language generated by CFG is called _____.

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Answer (Please select your correct option)

- Infinite
- Context Free Language (CFL)
- Regular
- Finite

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Question No : 22 of 52 Marks: 1 (Budgeted Time 1 Min)

If r1 and r2 are regular expressions then (r1) (r2) is a _____.

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Answer (Please select your correct option)

- RE
- TG
- FA
- GTG

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Question No : 23 of 52 Marks: 1 (Budgeted Time 1 Min)

Which of the following is RE for a language defined over Σ=(a,b) having words starting with a:

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Answer (Please select your correct option)

- (a + b)*
- aa(a + b)+
- a(a + b)*
- a*(a + b)

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Question No : 24 of 52 Marks: 1 (Budgeted Time 1 Min)

The _____ machine helps in building a machine that can perform the addition of binary numbers.

pg 60

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Answer (Please select your correct option)

- Incrementing
- Complementing
- Decrementing
- Multiplication

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Question No : 25 of 52 Marks: 1 (Budgeted Time 1 Min)

Left hand side of a production in Conext free grammer (CFG) consists of _____.

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Answer (Please select your correct option)

- One terminal
- More than one terminal
- One non-terminal
- Terminals and non-terminals

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Question No : 26 of 52 Marks: 1 (Budgeted Time 1 Min)

A regular language _____.

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Answer (Please select your correct option)

- Must be finite
- Must be infinite
- Can be finite or infinite
- Complex Language

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Question No : 27 of 52 Marks: 1 (Budgeted Time 1 Min)

If a language can be expressed by a regular expression, then its complement is _____ .

pg 66

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Answer (Please select your correct option)

- Regular
- Non Regular
- Finite
- Infinite

Made by: Waqar Siddhu

Question No : 28 of 52 Marks: 1 (Budgeted Time 1 Min)

If a given Context Free grammar (CFG) contains a production of the form S→Λ, then _____

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Answer (Please select your correct option)

- The corresponding CFL is not empty.
- The corresponding CFL is empty.
- The corresponding CFL is not empty if the language is regular
- The corresponding CFL is empty and non regular.

Made by: Waqar Siddhu

Question No : 29 of 52 Marks: 1 (Budgeted Time 1 Min)

Can a turing machine's head ever be in the same location in two successive steps?

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Answer (Please select your correct option)

- Yes
- Yes but only in finite languages
- No
- Yes but only in infinite langauges

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Question No : 30 of 52 Marks: 1 (Budgeted Time 1 Min)

In _____ there are Finite set of states containing exactly one START state and some (may be none) HALT states that cause execution to terminate, when the HALT states are entered.

pg 140

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Answer (Please select your correct option)

- TG
- Turing Machine
- GTG
- Finite Automata

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Question No : 31 of 52 Marks: 1 (Budgeted Time 1 Min)

Which of the following statement(s) is/are true or false?

1) The turing machine is similar to a finite automaton but with an unlimited and unrestricted memory.
2) A Turing machine is a much more accurate model of a general purpose computer.

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Answer (Please select your correct option)

- Statement 1 is true
- Statement 2 is true
- Both statements (1 & 2) are false
- Statement 2 is false

Made by: Waqar Siddhu

Question No : 32 of 52 Marks: 1 (Budgeted Time 1 Min)

We can have more than one parse trees for a given string in case of _____ Context Free Grammar (CFG).

pg 95

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Answer (Please select your correct option)

- vague
- ambiguous
- hazy
- simple

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Question No : 33 of 52 Marks: 1 (Budgeted Time 1 Min)

The language of $a^n b^n$ can be expressed by:

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Answer (Please select your correct option)

- FA
- TG
- GTG
- PDA

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Question No : 34 of 52 Marks: 1 (Budgeted Time 1 Min)

Which of the following theorem partitions Σ^* into distinct classes?

pg 73 bk

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Answer (Please select your correct option)

- Decidability theorem
- Myhill Nerode theorem
- Kleen's theorem
- Emptiness theorem

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Question No : 35 of 52 Marks: 1 (Budgeted Time 1 Min)

The languages are supposed to be _____ in case of testing pumping lemma.

to prove puming lemma theorem language
is suposed to be regular at first and thn
proof it non regular by pumping lemma

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Answer (Please select your correct option)

- context free
- irregular
- both regular and irregular
- regular

Made by: Waqar Siddhu

Question No : 36 of 52 Marks: 1 (Budgeted Time 1 Min)

Consider the following Context Free Grammar (CFG):

S → SX|XY
X → ZZ
Y → 1
Z → 0

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Answer (Please select your correct option)

- 00100
- 0010000
- 001
- 00010

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Question No : 37 of 52 Marks: 1 (Budgeted Time 1 Min)

A read state can have _____ outgoing edge/ edges.

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Answer (Please select your correct option)

- 1
- 2
- 3
- Any number of

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Question No : 38 of 52 Marks: 1 (Budgeted Time 1 Min)

Which of the following states do not have outgoing edges:

pg 104 bk

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Answer (Please select your correct option)

- Start
- Read
- Pop
- Accept

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Question No : 39 of 52 Marks: 1 (Budgeted Time 1 Min)

Consider the following Context Free Grammar (CFG):

S---->01A

A---->10B

B---->0A|11

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Answer (Please select your correct option)

- 011011
- 011011011
- 011001011
- 011001001011

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Question No : 40 of 52 Marks: 1 (Budgeted Time 1 Min)

Let us consider the following Turing machine (TM):

(y, Y, R)
(f, f, R)
(f, f, L)
(y, y, L)

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Answer (Please select your correct option)

- fffgggg
- fffggggf
- fffggg
- ffffggg

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Question No : 41 of 52 Marks: 2 (Budgeted Time 4 Min)

What is meant by "Left most Derivation" in context of CFG?

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Answer (Please click here to Add Answer)

Left most derivation

Definition

The derivation of a word w, generated by a CFG, such that at each step, a production is applied to the left most nonterminal in the working string, is said to be ***left most derivation***.

Made by: Waqar Siddhu

Question No : 42 of 52 — **Marks: 2 (Budgeted Time 4 Min)**

Explain the language L of string, defined over ∑= {0,1}, having double 0's or double 1's?

Consider the language L of strings, defined over Σ={0, 1}, **having double 0's or double 1's,** The language L may be expressed by the regular expression $(0+1)^*(00 + 11)(0+1)^*$

This language may be accepted by the following FA

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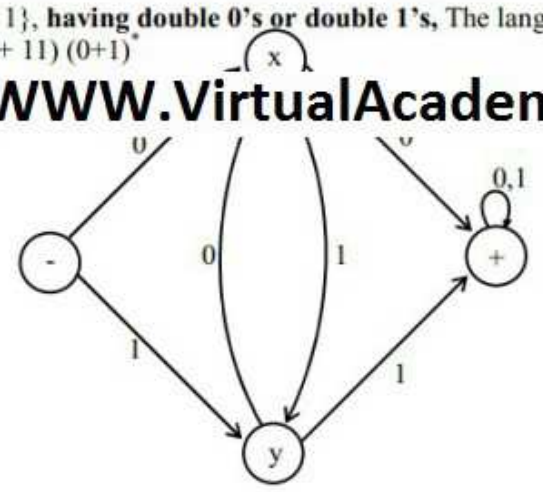

Made by: Waqar Siddhu

Question No : 43 of 52 — **Marks: 2 (Budgeted Time 4 Min)**

Consider the language defined by the following regular expression:

b(a + b)*a

What will be the corresponding Context Free Grammar (CFG)?

Answer (Please click here to Add Answer)

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Consider the following CFG

$S \rightarrow aXb|bXa$

$X \rightarrow aX|bX|\Lambda$

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

Made by: Waqar Siddhu

Question No : 44 of 52 — **Marks: 2 (Budgeted Time 4 Min)**

Consider live productions to be applied during derivation of a word. In your point of view what will be the ultimate result?

Answer (Please click here to Add Answer)

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It may be noted that every time a live production is applied during the derivation of a word it increases the number of nonterminals by one.

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Question No : 45 of 52 Marks: 3 (Budgeted Time 6 Min)

What is meant by the following statement ?

"LANGUAGE IS CLOSED"

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Answer (Please click here to Add Answer)

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

$S \rightarrow SS$
$S \rightarrow XS$
$S \rightarrow \Lambda$

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Question No : 46 of 52 Marks: 3 (Budgeted Time 6 Min)

Write three different parsing techniques.

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Answer (Please click here to Add Answer)

Parsing of word

Definition

The process of finding the derivation of word generated by particular grammar is called **parsing**.
There are different parsing techniques, containing the following three
Top down parsing.
Bottom up parsing.
Parsing technique for particular grammar of arithmetic expression.

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Question No : 47 of 52 Marks: 3 (Budgeted Time 6 Min)

Illustrate Decidable Problem with the help of an example.

Marks [1+2]

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Answer (Please click here to Add Answer)

Decidable problem

A problem that has decision procedure is called decidable problem *e.g.* the following problems
The two regular expressions define the same language.
The two FAs are equivalent.

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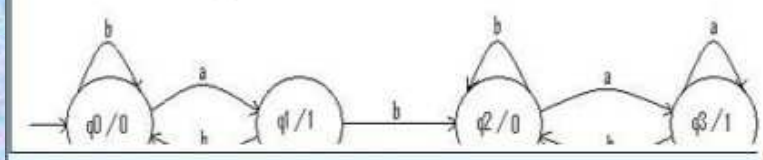
Question No : 48 of 52 Marks: 3 (Budgeted Time 6 Min)

Consider the following Moore machine:



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Answer (Please click here to Add Answer)

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Question No : 49 of 52 Marks: 5 (Budgeted Time 10 Min)

Consider the language L which is EVEN-EVEN, defined over $\Sigma = \{a,b\}$. In how many classes does L may partition Σ^*. Explain briefly.

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Answer (Please click here to Add Answer)

Example

Consider the language L which is EVEN-EVEN, defined over $\Sigma = \{a,b\}$. It can be observed that L partitions Σ^* into the following four classes

C_1 = set of all strings with even number of a's and odd number of b's.

C_2 = set of all strings with odd number of a's and odd number of b's.

C_3 = set of all strings with odd number of a's and even number of b's.

C_4 = set of all strings with even number of a's and even number of b's.

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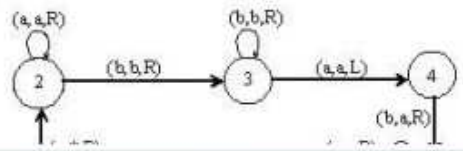
Question No : 50 of 52 Marks: 5 (Budgeted Time 10 Min)

Consider the following TM



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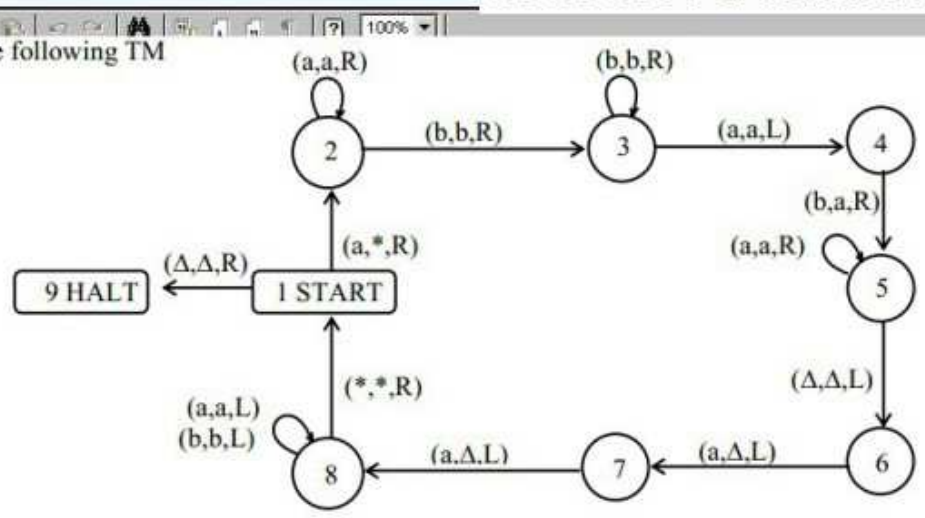
Answer (Please click here to Add Answer)

Consider the following TM



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The string aaabbbaaa can be observed to be accepted by the above TM. It can also be observed that the above TM accepts the non-CFL $\{a^n b^n a^n\}$.

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Question No : 51 of 52 — **Marks: 5 (Budgeted Time 10 Min)**

Derive Chomsky Normal Form (CNF) corresponding to the Context Free Grammar (CFG) given below:

$A \rightarrow BAB \mid B \mid \Lambda$

$B \rightarrow 00 \mid \Lambda$

Answer (Please click here to Add Answer)

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Question No : 52 of 52 — **Marks: 5 (Budgeted Time 10 Min)**

Suppose a Maze of 20 boxes; 1 box for initial and 1 for final state. 6 boxes are for non-moveable states while the rest can be used for transitions. Draw a Nondeterministic Finite Automaton (NFA) fo the given Maze.

Marks [2.5+2.5]

Answer (Please click here to Add Answer)

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