

# K. J. Somaiya College of Engineering, Mumbai-77 (A Constituent College of Somaiya Vidyavihar University) Department of Electronics and Computer Engineering



Course Name:	TACD	Semester:	V
<b>Date of Performance:</b>	18 / 10 / 2024	Batch No:	B - 1
Faculty Name:	Prof. Amrita Naiksatam	Roll No:	16014022050
Faculty Sign & Date:		Grade / Marks:	/ 25

**IA - 1** 

Question: Construct a PDA for the language  $L = \{wcwR \mid w \in \{a,b\}^*\}$ .

TACD IA1 Semester: V Academic Year: 2024-25

Roll no. 16014022050







## **Constructing PDA:**

	TACD IA I
	Ketaki Mahajan
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	(1)0107
l.	
	TACD IAI
21	1 1 1 mg 1 1/2 / 1 mg 1 = / 12 1 2 R / W = faib2 * 7
Q.6.	Construct a DA for the language L= { wcw l w & laib3 * }.
Ja si	with the state of the state of the prophies
	a data bahar
	For example lits take a string w, which is combination of
	(a1b)
1 1 1	
	$\omega = abb$
	$\omega^R = bba$
58 1	: conluterating = abb C bba
	push into w ) wr stack
3.00	stak
	Skip
	V V
	20
	and they have the tell
700	gard of the day had the state of the state o
•	Transitions for the POA are given by,
1.50	$S(q_0, q, z) = (q_0, q_2)$
	$\mathcal{J}(q_0,b,z) = (q_0,bz)$
	$S(q_0, c, z) = (q_0, \epsilon)$
9,3,363	
	$S(q_0, q, q) = (q_0, qq)$
54 170-	$\mathcal{S}(q_0, q, b) = (q_0, q_b)$
· .	S(90,b,a) = (90,b)
	$S(q_0,b,b) = (q_0,bb)$
	$S(q_0, C, a) = (q_1, a)$
	$S(q_1, a, a) = (q_1, \ell)$ Symbol.
	S(91,66) = (91,8) · 90 is the initial state
	S(9,,e,k) = (9, e) · Sming is accepted knough an empty stack
	an emply stark
	tru a data







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	captase	1-9 Network	6
(alale)	03		6
		Ø.	6
(1).	lulia las contement no can	INT DAY	6
	Rules for implementing 10A,		6
S # 2 5/16	Initial setup: load input string in inpu	it buffer, push &	•
	as initial stack symbol & counter the	machine in at	6
	untial state go.		6
1000 0	delle state a strong of contine in contine	For example	6
	Rules:	1913	6
1).	ItP symbol is 0 & stack top is Z, p	wsh'A' into stack &	6
	read next chan.	D = 66a	
2). IIP symbol is I & stack top is 2, push symbol			_
	stack & nead next char.	113	-
	IIP sympl is 0 & stack top is A/B	, push 'A ' into	_
	Stack 4 reach next that.		_
	IIP symbol is 1 & stack top is AIB,	push '8' into	_
	stack & pead next char.		_
5).	IIP symbol is C, stack top is A or B	, change state	-
	from go to q . I nead next char	o Transhiera la	
6).	IP the symbol is 0, machine sta	ti is go 4 stack	-
	top is A then pop stack top 4		
7).	IIP symbol is I, machine state is	g , and stack	
	top is B, pop stack top 4 read	next char.	
8).	If all characters of input strings are	parsed, stalk	Y
	rop is z and machine state is q		N.
	String is valid, pop & from stack		A
	from 9, 10 92.	(B, D, O, B)	7
V	12 is distributed the state of	12 2 2015	

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	91	3		
•	Transition diagram,			
	(a	, a / E )		
	(a1b (ab) (b1b (E)			
	(a,a/aa) (a,zo/azo)	(E, ZolZo)		
	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			
	(b) 20 /b20)			
	(6,6/66)			
	(bia/ba)			
	Example String	Let PDA machin be defined as		
	$\omega = baacaab \in$ $\uparrow \uparrow \uparrow \uparrow$ skip	M(P, E, F, 8, 90, 20, F), Dune,		
	7 AT Skip	· 9: set of states {90,9,92}		
		· E: set of symbols: daib, cy		
	d >000	· Γ: set q stack symbols: «AIBIZA?  go: initial state (qo)		
	1/	· Zo: initial stack symbol		
	20	· F: set of final state: & (null as		
		· F: set of final state: & (null as  de vision is based on if stack is  empty or not)		
		emply or nots		
100 March 1980		· 8: transition function		
		U		

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#### **Implementation using C++ Code:**

```
#include <iostream>
#include <stdio.h>
using namespace std;
int main()
    char Input[100];
    char stack[100];
    int Top = -1;
    cout << "Enter string to be validated:\n";</pre>
    cin.getline(Input, 100);
    stack[++Top] = 'Z';
    int i = -1;
q0:
    i++;
    if (Input[i] == 'a' && stack[Top] == 'Z')
        stack[++Top] = 'A';
        goto q0;
    else if (Input[i] == 'b' && stack[Top] == 'Z')
        stack[++Top] = 'B';
        goto q0;
    else if (Input[i] == 'a' && (stack[Top] == 'A' || stack[Top] == 'B'))
        stack[++Top] = 'A';
        goto q0;
    else if (Input[i] == 'b' && (stack[Top] == 'A' || stack[Top] == 'B'))
        stack[++Top] = 'B';
        goto q0;
    else if (Input[i] == 'c' && (stack[Top] == 'A' || stack[Top] == 'B'))
        goto q1;
    else
```



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```
goto Invalid;
q1:
    i++;
    if (Input[i] == 'a' && stack[Top] == 'A')
        Top--;
        goto q1;
    else if (Input[i] == 'b' && stack[Top] == 'B')
        Top--;
        goto q1;
    else if (Input[i] == '\0' && stack[Top] == 'Z')
        goto Valid;
    else
        goto Invalid;
Valid:
    cout << "\nOutput: Valid String";</pre>
    goto exit;
Invalid:
    cout << "\nOutput: Invalid String";</pre>
    goto exit;
exit:
    return 0;
```



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#### **Code Output:**

- Test String baacaab
- Test String abababbcbbababb
- Test String aaabbbbcaaabbbb
- Test String bababcbabab

PS C:\Users\admin\OneDrive\Desktop\sem 5\theory of automata> cd "c:\Users\admin\OneDrive\Desktop\sem 5\theory of automata\"; if (\$?) { g++ IA1\_PDA.cpp -0 IA1\_PDA }; if (\$?) { .\IA1\_PDA } Enter how many strings you have: 4

Enter string 1 to be validated: baacaab

Output: Valid String

Enter string 2 to be validated: abababbcbbababb

Output: Invalid String

Enter string 3 to be validated: aaabbbbcaaabbbb

Output: Invalid String

Enter string 4 to be validated: bababcbabab

Output: Valid String

PS C:\Users\admin\OneDrive\Desktop\sem 5\theory of automata>

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