U1905076
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Tutorial -9
Automata and Formal Languages
OI] Design push down automato for Sanbin + mcm/n, m>=13 and gave 6.8 pecificalism for PDA
M= { {90,91,92,93}, {ga,b,c3, {N,m3,8,90, E, 93}
Where $8 = 8 = 8 = 8 = 8 = 8 = 8 = 8 = 8 = 8 $
$8(q_0, \alpha, E) = (q_0, N)$ $8(q_0, \alpha, N) = (q_0, NN)$ $8(q_0, b, N) = (q_1, E)$ $8(q_1, b, N) = (q_1, E)$
$8(q_1,b,E) = (q_1,m)$ $8(q_1,b,m) = (q_1,mm)$ $8(q_1,C,m) = (q_2,E)$
$8(q_2, c, m) = (q_2, \epsilon)$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$
(82) Find a push down automata that recognized the following languages and give 6 tuple specification for PDA
L= {a b x c i+2k   i, K > = 0 }
Ans M= [{q0,9,192,93}, {ab, c3, &I, K3, 8,90/13

where I is defined by.
$8(q_0, \alpha, \varepsilon) = (q_0, \tau)$
$8(q_0,a_1I) = (q_0,II)$
$S(q_0, b, E) = (q_0/KE)$
$8(q_0,b,I) = (q_0,KKI)$
$g(q_0,b,k) = (q_0,KKK)$
$8(q_0,c,I) = (q_0,E)$
$8(q_{1},c_{1},k) = (q_{2},E)$
$8(q_{2},c_{1}^{T})=(q_{2},\epsilon)$
$8 \left( q_2, c, k \right) = \left( q_2, \epsilon \right)$
$8(q_2, \xi, \xi) = (q_3, \xi)$
C, I/E
LK/KK CKIC TO EXE EXE
$\rightarrow 90$ $h (1 \times 1)$ $(91)$ $(92)$
b, K/KKK C, I/E
B, K/KKK C, K/E
83] Find the language
S -> a ABB/aAA
$A \rightarrow aBB/a$
$\frac{A \Rightarrow aBB/a}{B \Rightarrow bBB/A}$
Ang S -> {aaa, aabaaa, waabaa, 3
S is set of all strings of a and b such that strings starts with 2 a's and ends with 2a's and clength of string is even and also string includes 'aaa'
etains starts with 2 a's and ends with 2a's
and length of string is even and also string
includes and
unalls and
Styl Find the Pannymone: -
S4 Find the language: - S -> aAa A -> Sb   bcc   Data
A > Ch   har   nath
H / DD I DW I DW.

C - abb | DD D - aDA Any E and D states, are unnecessarily as f state is unreschable and D is ambiguous. Reduced gerammer is -S->aAa, A-> eb/bcc, (-> abb Language of S: Sababbabba, ab abba bbba ... 3 S is set of strings starting and ending with S = ab (abb) 2 5 x a \$5] Find a push down automata with 2 states that accepts language:-A)  $1 - \{a^n b^{2n} \mid n > = 1\}$ Ans M = SEq0,9,3, {a,b}, SNJ, 8, 90, E, 9, 9 Where & is defined are: -= (9,01NN)  $= (q_{1}, \varepsilon)$ = (go, NNN)

B] 2 = { a<sup>2</sup>n b<sup>2</sup>m e<sup>m</sup> d<sup>2</sup>n | n>=0, m>0} m = { {90,9,3, {a,b,c,d3, {N,m3,8,90, {3,3}}

where S is defined by ..

$$S(q_0, a, E) = (q_0, NNN)$$
  
 $S(q_0, a, N) = (q_0, NNNN)$   
 $S(q_0, b, N) = (q_0, mN)$   
 $S(q_0, b, m) = (q_0, m)$   
 $S(q_0, b, E) = (q_1, E)$   
 $S(q_0, c, mm) = (q_1, E)$   
 $S(q_1, c, mm) = (q_1, E)$   
 $S(q_1, d, mn) = (q_1, E)$   
 $S(q_1, e, E) = (q_1, E)$ 

-> 90- -- > 91)

a, E/NNM c, mm/E

a, N/NNNN d, NN/E

b, E/M E, E/E

b, N/MN

b, m/mm

Consider a push-down automata

M = & & q, 90 - q 3 & So, 1, 6 3, & R, 6, B3, & 9

where S is defined as:-

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S (q1,0,R)	- (9	4	
8 (91,0,8)	= (9		
8 (9,0,6)		(BG)	
S (q, , 6, R)	(9;	2, R) 1 B)	
8 (q, 6, B)	= (7	2,8)	
5 (91.6,6)	= (0	12,8)	
S (92,0,B)	= (	92, 8)	
$S(q_e, E, R)$	= (	71, GR)	
8 (q,1,8) 8 (q,1,8)	_	VI, GB)	
8 (911,6)			
8 (92,1,6)	= (0	12 7 E)	
		,	
Ans Griven an input string	execution	Gace PD.	A M showing
Any Green an	0010100	is in	N(M)
oupus o		. 1	11 + 044
Input symbol Initial	Stack	state	Next - State
Tnitial	P	91	91
0			91
0	BBR	9,	21
	GBBR	91 91	92
Ø C	GBB R	and the second s	92
	BBB	92	92
0	BR	0/2	92
O	R	9/2	92
ε	$\mathcal{E}_{-}$	81	VE
Input symbol	Stack	8	
griphit	1	١٠.٠.٨١	(m)
Mence 00	11 6100'	is in N	,111)
TOMOL			

and the second s				
Sal Design a c and too	PDA for	galindrom abcha	with mid	ldle symbol
m = 5 890 9	and the second of the second of	The second second second		}
where S	is defined	as		
S(90, a,		(90, A)		
SCgo, b,	٤) =	(90,B)		
8 (go, a,		(go, AA)	en anninger before de particular para annota so france en antire d'anna particular.	
8690,6,		190, BA		
8(90,0,		(91/8		
S (90, a,		(go, A		
8 Cgo, b, 8		(90,B1		
8 (90,0,1		(9), A	1	
8 90,0,9		(91,B)		
8 (qq, b,	^	(9, )		Market and the second s
		•		
	0 /0	(a, A/E		
$\longrightarrow (9_0)$	C, B/B	(91) b, B/	٤	
()	C, A/A			
0,8/A	b; E/B			
a, A/A	A STATE OF THE PARTY OF THE PAR	and the second s		the control of the co
a, B/1		THE RESERVE OF THE PARTY OF THE		
Tracing a	bcba			
Somet andal	stack	state	next-state	7
Input symbol	A		90	Hence
h	8 A-	90		1 0
<i>U</i>	BA	- do	90	babiba
	A	90	71	1 us
4	Name and Address of the Part of the Control of the	9)	2)	accepted
l	3	°V1	91	

	6 . 1/ 6 / 1 / 6 30
	Q8. Design a PDA for 1 = 3 a b c / 1 ) 12 and
	98. Design a PDA fon 1 = {a'b'ck   i j k > 0 and i = j on j = k}
11.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	Ans M= \$ {90,91,92,93} {a,b,c3, {I,I}, 8,90, 8,90
	2 2 21 . A. DOA possible
	only non deterministic PDA possible
	8 is defined as:
- 1	$8(q_0, \alpha, \epsilon) = (q_0, I)$
1 ,-	o go TT)
3.1 =	S(q, b, T) = S(q, JI), (q, vE)
	$S(q_1, h, J) = (q_1/J)$
	8 (9, 6, 8) - (93, 8)
1-	$8(q_2, c, J) = (q_2, E)$
1-	$\frac{8(q_2, \zeta)}{8(q_3, \zeta, \varepsilon)} = \frac{(q_2, \varepsilon)}{(q_2, \varepsilon)}$
1	$8(9_2, \varepsilon, \varepsilon) = (9_3, \varepsilon)$
11-	b, 3/8
1	>6) b, I/JI, 6, 4, 1/8, 6, 2,8/8, 76
1	(1)
	a, E/I b, J/JJ L, I/E
	0/I/II b, I/8 C, E/8
	8,8/8
29	Construct a PDA that accepts
	L= {WWR   W = (a+b) * }
	said the said of t
Ans	as L= WWR
1	$\Gamma N = (\alpha + b)^{*}$
	WW = (a+b) * (a+b) * = (a+b) * ]

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