

# **COMSATS** Institute of Information Technology, Islamabad Campus

### **Department of Computer Science**

## **Theory of Automata- CSC312**

## BCS – VI Assignment2

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## Q1: Design PDA's for the following languages

i. 
$$\{a^nb^{2n} \mid n>=1\}$$

2)	Designa b	on PDA for the following languages if they are irregular
	L=	2 a° b°, n > 03 b,a/a aa bbbbb, aaa bbbbbbb
		2 = \ a \ b \ 3
		b,a/a B,a/z Q, = A
		a a a initially
		(E)
	A	$\alpha, z_0 \xrightarrow{A} \alpha z_0$
	A	a,a A aa
	Α	b,a → B,a
	В	6, a → C, E
	C	$b, a \longrightarrow b, a$
	C	£, zo → F, zo

ii. All length palindrome language

ii)	All length palindrome language  L=2 WcW'   W=20,13*3 where	W' is the reverse of w
	10101010	1-038 3-07
	6, e   e S, Z e   Z e	"a+"3"a «
	1,0/10	(C)
	1,1,11	1000
	1, Zo   1 Zo O, Zo   0 Zo	
	1, 1/e 0, 0/e	
	10, 0/6	4.5

iii.  $\{0^n1^m2^n \mid n>=1, m>=1\}$ 

iiiy	₹o^ 1~2~3
,	0, z <sub>0</sub>  0z <sub>0</sub> 0, 0 00 1,0 0 (2) 2,0 E (2) 2,z <sub>4</sub> E
	6 (go, 0.20) = (go, 020)
	$ \begin{cases} (9_{0},0.0) = (9_{0},00) \\ 6(9_{0},1.0) = (9_{0},0) \end{cases} $ $ \begin{cases} (9_{0},1.0) = (9_{0},0) \end{cases} $
	$ \begin{array}{ll} 0 & (w_1, 1, 0) & (A_1, 0) \\ 6 & (Q_1, 0, 0) & = (Q_1, \varepsilon) \\ 6 & (Q_2, 1, 0) & = (Q_2, \varepsilon) \end{array} $
	$ \begin{cases} (9_{1}, \xi, Z_{0}) = (9_{7}, \xi) \\ P = (9_{1}, 9_{1}, 9_{1}, 9_{1}, 9_{1}, \frac{3}{2}, \frac{3}{2$
	- Yen

Q2: Prove that following languages are irregular using Pumping Lemma

i. {a<sup>n</sup>b<sup>2n</sup> }

	Question # 2
	Prove the following languages are irregular using Pumping
	Lemma
i	¿an bin }
	(i) for each i >0 , xy i z EL )
	(i) 141 >0 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
	/iii)  z <sub>4</sub>   ≤n
	aabbbb El
	let ( ) it!
	→ pump value of i so (66) i+1
	aa bbbb bb &1
	aa bbbb bb \$1
	According to this 6 should be In but it is three times
-	Hecording to that of should be
	3 2 62 4 6

ii. Odd Palindrome (All strings are of odd length)

(ii)	Odd Palindrome (All strings	are of odd length)
	an ban aa baa	
	push value of i so (b) 1+1	(0.9) (0.0)
	aa bb aa x y z	(0.0) (9.5)
	aa bb aa {arbar}	(3.8) = (3.2)
		(3 4) = (4 5)

# Q3: Design Turing machines to recognize the following languages



