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## Internal Assessment Test 5 – Feb 2022

Sub:	Automata The	ory & Comput	tability		Sub Code:	18CS54	Brai	nch:	ISE			
Date:	05/01/2022 Duration: 90 min's Max Marks: 50 Sem/Sec: V A, B & C											BE
		An	swer any FI	VE FULL Quest	<u>ions</u>				MA	RKS	CO	RBT
1	(a) Write	down the for	mal definition	on of Nondetern	ninis	tic finite aut	omata (NFA).		[6 + 4]	4 =10]	CO1	L2
	Define	extended tra	insition fund	ction and L(M) v	wher	e L is the lar	nguage and M	is				
	the machine.											
	(b) Define Epsilon closure of Nondeterministic finite automata with epsilon/null											
	move. (NFA - epsilon).											
2	(a) Consider the following NFA and describe the processing of the input string w =											L2,
_	abbab. Show all the steps.									= 10]		L3
	(b) Convert the following NFA to DFA (Deterministic finite automata). q <sub>s</sub> is the start											
	state, $q_2$ is the final state. $\Sigma = \{a,b\}$ .											
	a b											
	$q_s$ $\{q_s,q_1\}$ $\{q_s\}$											
	$q_1$ $q_2$ $q_2$											
	$q_2$		<b>{Φ</b> }			<b>{Φ</b> }						
3	(a) Define	e regular ex	epression f	formally. (Show	w th	e base clas	ss and induc	tive	[5 +	5=10]	CO3	L2,
	class both formally).											L3
	(b) "For each regular expression there exist an NFA - epsilon" – Justify the											
	statement intuitively and show all the required constructions.											

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## Internal Assessment Test 1 – November 2021

	Internal Assessment Test 1 – November 2021											
Sub:	Computer Netv	works and Sec	curity			Sub Code:	18CS52	Bran	nch:	ISE		
Date:	11/11/2021				OE	BE .						
			MA	RKS	CO	RBT						
1	(a) Write of		[6+4]	4=10]	CO1	L2						
	Define extended transition function and L(M) where L is the language and M is											
	the machine.											
	(b) Define Engiler closure of Nondeterministic finite outemate with											
	(b) Define Epsilon closure of Nondeterministic finite automata with											
	epsilon/null move. (NFA - epsilon).										CO2	L2,
2	(a) Consider the following NFA and describe the processing of the input string w =									5 =10]	CO2	L2, L3
	abbab. Show all the steps.											LS
	(b) Convert the following NFA to DFA (Deterministic finite automata). $q_s$ is the start state, $q_2$ is the final state. $\Sigma = \{a,b\}$ .											
	state, q											
	a b											
	$q_s$ $\{q_s,q_1\}$ $\{q_s\}$											
	$q_1$ $\{q_2\}$ $\{q_2\}$											
	$q_2$ { $\mathbf{\Phi}$ }											
3	(a) Define regular expression formally. (Show the base class and inductive										CO3	L2,
	class both formally).											L3
	(b) "For each regular expression there exist an NFA - epsilon" – Justify the											
		_	-			-	3 distily					
l	statement intuitively and show all the required constructions											

(a) L = Set of all strings where 'aa' and 'bb' should not come together. $\Sigma = \{a,b\}$ (b) L = $\{a^nb^m \mid n>=1, m>=3\}, \Sigma = \{a,b\},$ (c) L = Set of all strings where second symbol from right hand side is always 'a'. $\Sigma = \{a,b\}$ (d) Set of all strings - start with 'a' and end with 'b', but 'bb' should not come together. $\Sigma = \{a,b\},$ (a) Convert the following regular expression to NFA.  Y*(XX*(YY*+\varepsilon) + \varepsilon), \sum = \text{epsilon/Null move} (b) Convert the following NFA to regular expression. A is start and final state. \sum = \text{(SY,Y)}  \[ \begin{array}{c ccccccccccccccccccccccccccccccccccc											
(a) L = Set of all strings where 'aa' and 'bb' should not come together. $\Sigma = \{a,b\}$ (b) L = $\{a^nb^m \mid n>=1, mn>=3\}, \Sigma = \{a,b\},$ (c) L = Set of all strings where second symbol from right hand side is always 'a'. $\Sigma = \{a,b\}$ (d) Set of all strings - start with 'a' and end with 'b', but 'bb' should not come together. $\Sigma = \{a,b\},$ [5+5=10] CO3 [1 (2 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3	4	Construct	[2.5+2.5+2.	CO2,	L3						
(b) $L = \{a^nb^m \mid n>=1, mn>=3\}, \sum = \{a,b\},$ (c) $L = \text{Set of all strings where second symbol from right hand side is always 'a'. } \sum = \{a,b\}$ (d) Set of all strings - start with 'a' and end with 'b', but 'bb' should not come together. $\sum = \{a,b\},$ 5 (a) Convert the following regular expression to NFA. $Y^*(XX^*(YY^* + \varepsilon) + \varepsilon), \sum = \{X,Y\}, \varepsilon = \text{epsilon/Null move}$ (b) Convert the following NFA to regular expression. A is start and final state. $\sum = \{X,Y\}$ $X \qquad Y$ $A \qquad \{B\} \qquad \{C\}$ $B \qquad \{\Phi\} \qquad \{A\}$ $C \qquad \{A\} \qquad \{B\}$ $C \qquad \{A\} \qquad \{B\}$ $C \qquad \{A\} \qquad \{B\} \qquad \{C\}$ $B \qquad \{\Phi\} \qquad \{q\} \qquad \{q\} \text{ is the start state, } q_2 \text{ is the final state. } \sum = \{a,b,c\}$ $C \qquad a \qquad b \qquad Epsilon (\varepsilon)$ $q_s \qquad \{\Phi\} \qquad \{q_s\} \qquad \{\Phi\} \qquad \{q_1\} \qquad \{q_2\}$			5+2.5=10	CO3							
(c) L = Set of all strings where second symbol from right hand side is always 'a'. $\Sigma = \{a,b\}$ (d) Set of all strings - start with 'a' and end with 'b', but 'bb' should not come together. $\Sigma = \{a,b\}$ ,  5 (a) Convert the following regular expression to NFA. $Y^*(XX^*(YY^* + \varepsilon) + \varepsilon), \Sigma = \{X,Y\}, \varepsilon = \text{epsilon/Null move}$ (b) Convert the following NFA to regular expression. A is start and final state. $\Sigma = \{X,Y\}$ $X  Y  A  \{B\}  \{C\}  B  \{\Phi\}  \{A\}  \{B\} \}$ C $\{A\}  \{B\}  \{B\}  \{C\}  \{A\}  \{B\} \}$ 6 (a) Convert the following regular expression to NFA – epsilon. $(0 + 10)^* 11$ (b) Remove the epsilon move from the following NFA – epsilon and find out the equivalent NFA. $q_s$ is the start state, $q_2$ is the final state. $\Sigma = \{a,b,c\}$ $C  a  b  \text{Epsilon } (\varepsilon)$ $q_s  \{\Phi\}  \{q_s\}  \{\Phi\}  \{q_1\}  \{q_2\}$											
			right hand side is always 'a' \ \ -	_							
(d) Set of all strings - start with 'a' and end with 'b', but 'bb' should not come together. $\Sigma = \{a,b\}$ ,  (a) Convert the following regular expression to NFA. $Y^*(XX^*(YY^* + \varepsilon) + \varepsilon), \ \Sigma = \{X,Y\}, \ \varepsilon = \text{epsilon/Null move}$ (b) Convert the following NFA to regular expression. A is start and final state. $\Sigma = \{X,Y\}$ $X \qquad Y$ $A \qquad \{B\} \qquad \{C\}$ $B \qquad \{\Phi\} \qquad \{A\}$ $C \qquad \{A\} \qquad \{B\}$ $C \qquad$		` '		ımgs w	nere s	second syn	11001 110111	right hand side is always a. Z =	-		
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(a) Convert the following regular expression to NFA. $Y^*(XX^*(YY^* + \varepsilon) + \varepsilon), \ \Sigma = \{X,Y\}, \ \varepsilon = \text{epsilon/Null move} $ (b) Convert the following NFA to regular expression. A is start and final state. $\Sigma = \{X,Y\}$ $X \qquad Y$ $A \qquad \{B\} \qquad \{C\}$ $B \qquad \{\Phi\} \qquad \{A\} \qquad \{B\}$ $C \qquad \{A\} \qquad \{B\}$ $C \qquad \{A\} \qquad \{B\}$ (a) Convert the following regular expression to NFA – epsilon. $(0+10)^*11$ (b) Remove the epsilon move from the following NFA – epsilon and find out the equivalent NFA. $q_s \text{ is the start state, } q_2 \text{ is the final state. } \Sigma = \{a,b,c\}$ $C \qquad a \qquad b \qquad Epsilon (\varepsilon)$ $q_s \qquad \{\Phi\} \qquad \{q_s\} \qquad \{\Phi\} \qquad \{q_1\} \qquad \{q_2\}$		` '									
$Y^*(XX^*(YY^*+\epsilon)+\epsilon), \Sigma = \{X,Y\}, \epsilon = epsilon/Null \ move \\ (b) \ Convert \ the \ following \ NFA \ to \ regular \ expression. \ A \ is \ start \ and \ final \ state. \ \Sigma = \\ \{X,Y\} \\ \hline \\ X                               $	5			lowing	regula	ar expressi	on to NFA		[5+5=10]	CO3	L3
(b) Convert the following NFA to regular expression. A is start and final state. $\Sigma = \{X,Y\}$ $\begin{array}{c ccccccccccccccccccccccccccccccccccc$				•	•	•			[0.0.10]		20
(b) Convert the following NFA to regular expression. A is start and final state. $\Sigma = \{X,Y\}$ $\begin{array}{c ccccccccccccccccccccccccccccccccccc$		$Y^*(XX^*(Y))$	$(Y^* + \varepsilon) + \varepsilon$	), $\Sigma = \{$	X,Y	$, \varepsilon = epsil$	on/Null n	nove			
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(b) Remove the epsilon move from the following NFA – epsilon and find out the equivalent NFA. $q_s$ is the start state, $q_2$ is the final state. $\Sigma = \{a,b,c\}$ $\begin{array}{c ccccccccccccccccccccccccccccccccccc$	6	<b>_</b>	nyort the fol	lowing	( )		,	onsilon (0 +10)*11	[5+5 - 10]	CO2	L2,
equivalent NFA. $q_s$ is the start state, $q_2$ is the final state. $\Sigma = \{a,b,c\}$ $\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0									CO2	L2, L3
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$\begin{array}{cccccccccccccccccccccccccccccccccccc$		eq									
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		c a h Encilon (c)									
$q_1$ $\{\Phi\}$ $\{q_1\}$ $\{q_2\}$			C	а		U	Epsilon	. (6)			
		$q_s$	<b>{Φ</b> }	$\{q_{s,}\}$		$\{\mathbf{\Phi}\}$	$\{q_1\}$				
		$q_1$	<b>{Φ</b> }	<b>{Φ</b> }		$\{q_1\}$	{q <sub>2</sub> }				
$egin{array}{cccccccccccccccccccccccccccccccccccc$		$q_2$	$\{q_2\}$	<b>(Φ)</b>		<b>{Φ</b> }	<b>{Φ</b> }				

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4	Construct (a) L = (b) L = (c) L = {a,l} (d) (d) tog	[2.5+2.5+2. 5+2.5 = 10]	CO3	L3				
5	(a) Con  Y*(XX*(Y  (b) Con  {X,Y}  A  B  C	[5+5=10]	CO3	L3				
6	(a) Cor (b) Rer equ	move the eps	silon move	cular expressi e from the fo	on to NFA – epsilon. $(0 + 10)^*11$ llowing NFA – epsilon and find out the is the final state. $\Sigma = \{a,b,c\}$ Epsilon ( $\epsilon$ ) $\{q_1\}$ $\{q_2\}$ $\{\Phi\}$	[5+5 = 10]	CO2	L2, L3