Register number _____

SRM Institute of Science and Technology
College of Engineering and Technology
School of Computing
SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: 2022-23 (ODD)

B.Tech-Computer Science & Engineering

Test: CLA-T1 **Date: 14.09.2022**
Course Code & Title: 18CSC301T & Formal Languages and Automata Theory
Duration: 1 period
Year & Sem: III Year /V Sem **Max. Marks: 25**

SET-D

Course articulation matrix:

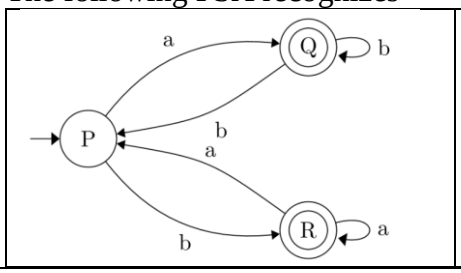
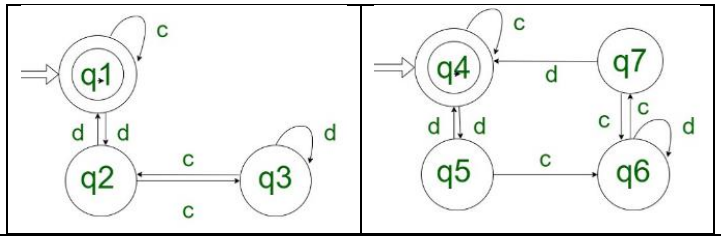
PLO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO 1	M	H	-	M	L	-	-	-	L	L	-	H	-	-	-
CO2	M	H	L	M	L	-	-	-	M	L	-	H	-	-	-
CO3	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CO4	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CO5	H	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CO6	L	H	-	H	L	-	-	-	L	L	-	H	-	-	-

Part - A

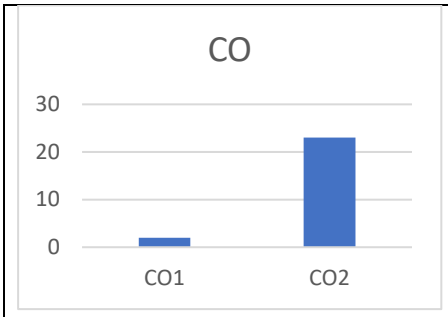
Instructions: Answer all

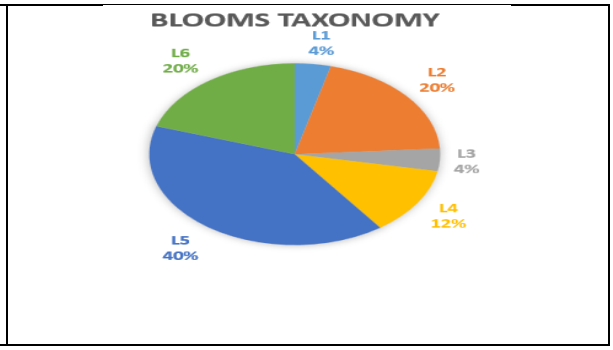
Q. No	Question	Marks	BL	CO	PO	PI Code
1	" If it rains, then the weather will be cool". Which of the following is true? a) Hypothesis is followed by conclusion b) Conclusion follows hypothesis c) Conclusion cannot be deduced from hypothesis **d)** Hypothesis is deduced from conclusion	**1**	2	1	1	**1.6.1**
2	" English is a language that is formed from 26 alphabets". Which operation enables the formation of words in English? a) Union b) Closure c) Concatenation d) Substring	1	2	1	**1**	**1.6.1**
3	What is the minimum number of states required by the DFA that accepts the language? L={a | a is a number divisible by n} ? a) n-1 b) n c) n+1 d) 2^n	1	3	2	2	**2.6.2**
4	Give the regular expression that generate strings with "101" as substring over the input Σ={0,1} a) (0+1)*101 (0+1)* b) (0+1)*101 c) 101 (0+1)* d) (101)*	1	4	2	2	**2.6.2**
5	Which of the following is false? a) DFA cannot move to same state for two different inputs b) DFA can move to same state for two different inputs c) DFA can move to two different states for different inputs d) DFA cannot contain transitions for null symbol	1	2	2	1	**1.6.1**

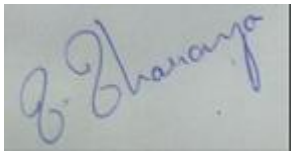
Register number _____

6	Which of the following is the transition function of ε-NFA? a) Q x (Σ U ε) → 2^Q b) Q x (Σ U ε) → Q c) Q x Σ → 2^Q d) Q x Σ → Q	1	1	2	1	**1.5.1**
7	Consider R1=0*(10*)*. The equivalent of R1 is a) (1*0)*1* b) 0+(0+10)* c) (0+1)*10(0+1)* d) No equivalent expression	1	4	2	2	**2.7.1**
8	The following FSA recognizes  a) (ba*a+ab*b*)*(ab*+ba*) b) ab*bab*ab*+(ba*a)*ba* c) (ab*b)*ab*+(ba*a)*ba* d) (ab*b+ba*a)*(a*+b*)	1	4	2	2	**2.6.3**
9	Two FSAs can be said equivalent if a) They have equal number of edges b) They have equal number of states c) They accept same language d) They have equal number of states and edges	1	2	2	2	**2.6.2**
10	What is the hierarchy of ε-NFA, DFA and NFA in increasing order of flexibility? a) ε-NFA, NFA, DFA b) NFA, ε-NFA, DFA c) DFA, NFA, ε-NFA d) DFA, ε-NFA-NFA	1	2	2	2	**2.6.3**
	Part-B (1 x 5=5 marks)					
11	A company has to assign employee IDs to its workers. The employees in managerial cadre will be assigned IDs starting with "MA" while the other workers will be assigned with IDs staring with "WR". The remaining part of their IDs should contain even number of a's and b's. Create a DFA to this.	5	5	2	6	**6.3.1**
	Part-C (1 x 10=10 marks)					
12	Investigate whether the given DFA's are equivalent using Myhill Nerode theorem:  	10	6	2	4	**4.3.1**

Register number _____







Approved by ~~Audit Professor~~/ Course Coordinator

Register number _____

SRM Institute of Science and Technology
College of Engineering and Technology
School of Computing
SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: 2022-23 (ODD)

B.Tech-Computer Science & Engineering

Test: CLA-T1 **Date: 14.09.2022**
Course Code & Title: 18CSC301T & Formal Languages and Automata Theory
Duration: 1 period
Year & Sem: III Year /V Sem **Max. Marks: 25**

SET-D

Course articulation matrix:

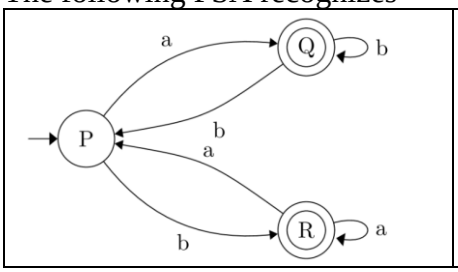
PLO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO 1	M	H	-	M	L	-	-	-	L	L	-	H	-	-	-
CO2	M	H	L	M	L	-	-	-	M	L	-	H	-	-	-
CO3	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CO4	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CO5	H	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CO6	L	H	-	H	L	-	-	-	L	L	-	H	-	-	-

Part - A

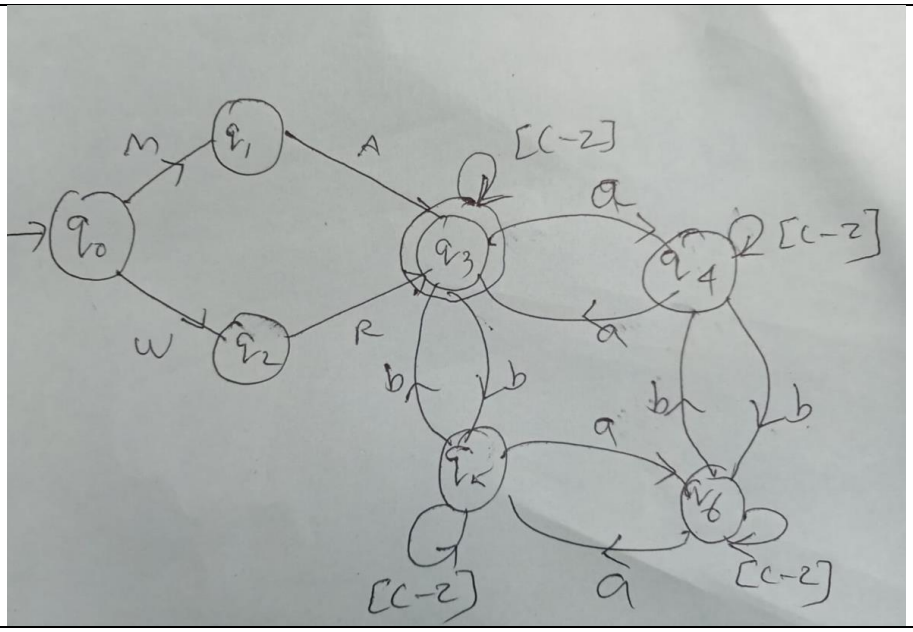
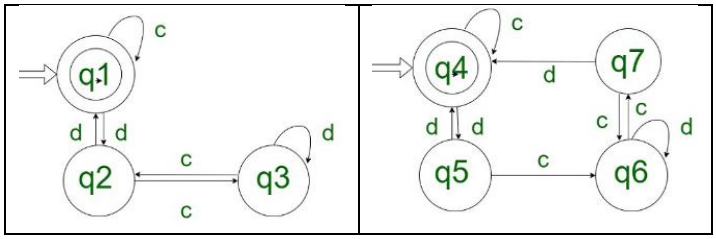
Instructions: Answer all

Q. No	Question	Marks	BL	CO	PO	PI Code
1	" If it rains, then the weather will be cool". Which of the following is true? a) Hypothesis is followed by conclusion b) Conclusion follows hypothesis c) Conclusion cannot be deduced from hypothesis **d)** Hypothesis is deduced from conclusion **Ans: d)**	**1**	2	1	1	**1.6.1**
2	" English is a language that is formed from 26 alphabets". Which operation enables the formation of words in English? a) Union b) Closure c) Concatenation d) Substring Ans: b)	1	2	1	**1**	**1.6.1**
3	What is the minimum number of states required by the DFA that accepts the language? L={a | a is a number divisible by n} ? a) n-1 b) n c) n+1 d) 2^n Ans: b)	1	3	2	2	**2.6.2**
4	Give the regular expression that generate strings with "101" as substring over the input Σ={0,1} a) (0+1)*101 (0+1)* b) (0+1)*101 c) 101 (0+1)* d) (101)* Ans: a)	1	4	2	2	**2.6.2**
5	Which of the following is false?	1	2	2	1	**1.6.1**

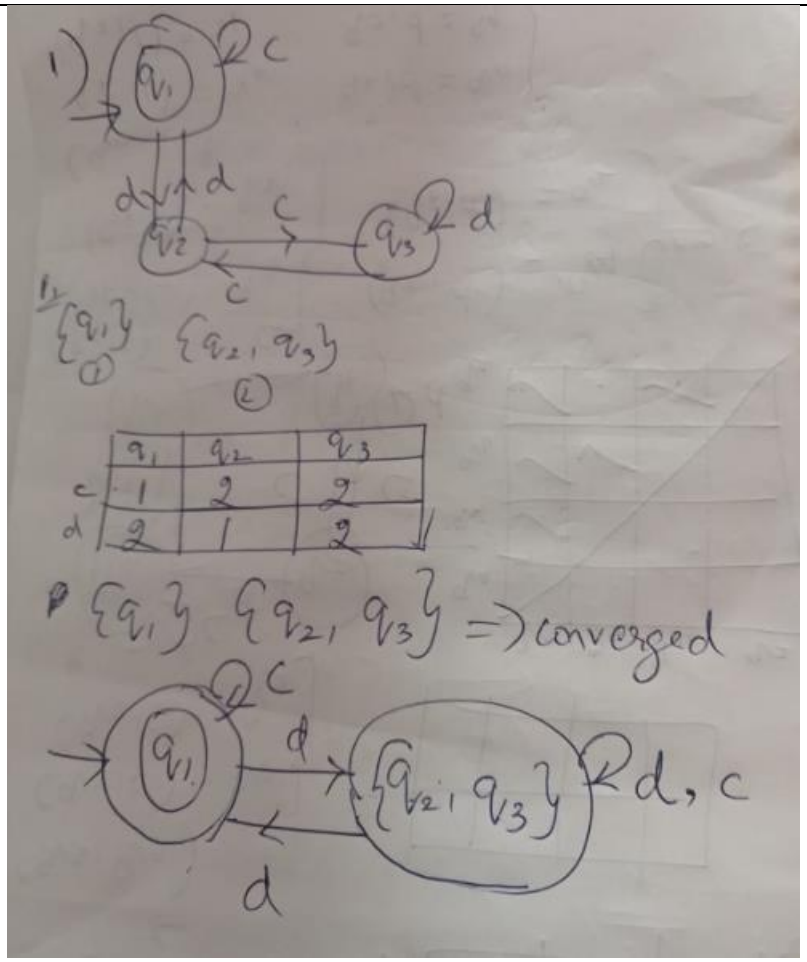
Register number _____

	a) DFA cannot move to same state for two different inputs b) DFA can move to same state for two different inputs c) DFA can move to two different states for different inputs d) DFA cannot contain transitions for null symbol Ans: a)					
6	Which of the following is the transition function of ε-NFA? a) Q x (Σ U ε) → 2^Q b) Q x (Σ U ε) → Q c) Q x Σ → 2^Q d) Q x Σ → Q Ans: a)	1	1	2	1	**1.5.1**
7	Consider R1=0*(10*)*. The equivalent of R1 is a) (1*0)*1* b) 0+(0+10)* c) (0+1)*10(0+1)* d) No equivalent expression Ans A	1	4	2	2	**2.7.1**
8	The following FSA recognizes  a) (ba*a+ab*b*)*(ab*+ba*) b) ab*bab*ab*+(ba*a)*ba* c) (ab*b)*ab*+(ba*a)*ba* d) (ab*b+ba*a)*(a*+b*) Ans: c	1	4	2	2	**2.6.3**
9	Two FSAs can be said equivalent if a) They have equal number of edges b) They have equal number of states c) They accept same language d) They have equal number of states and edges Ans: c)	1	2	2	2	**2.6.2**
10	What is the hierarchy of ε-NFA, DFA and NFA in increasing order of flexibility? a) ε-NFA, NFA, DFA b) NFA, ε-NFA, DFA c) DFA, NFA, ε-NFA d) DFA, ε-NFA-NFA Ans: a)	1	2	2	2	**2.6.3**
	Part-B (1 x 5=5 marks)					
11	A company has to assign employee IDs to its workers. The employees in managerial cadre will be assigned IDs starting with "MA" while the other workers will be assigned with IDs staring with "WR". The remaining part of their IDs should contain even number of a's and b's. Create a DFA to this.	5	5	2	6	**6.3.1**

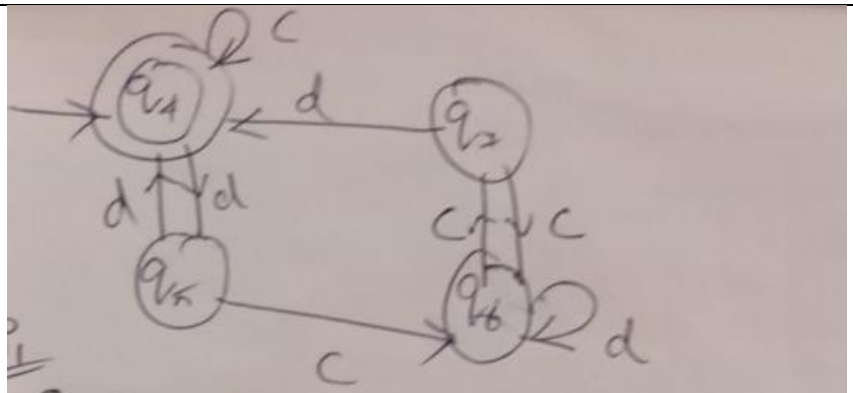
Register number _____

						
	Part-C (1 x 10=10 marks)					
12	Investigate whether the given DFA's are equivalent using Myhill Nerode theorem:  (4+4+2)	10	6	2	4	**4.3.1**

Register number _____

Register number _____



$\{q_1\}$ $\{q_5, q_6, q_7\}$

① ②

	q_1	q_5	q_6	q_7
c	1	2	2	2
d	2	1	2	1

$\{q_1\}$ $\{q_5, q_7\}$ $\{q_6\}$

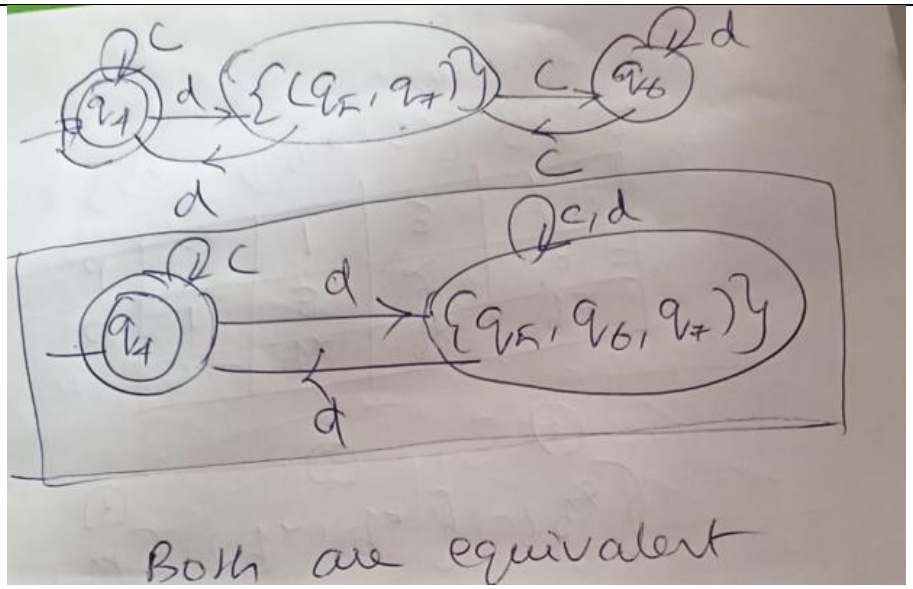
① ② ③

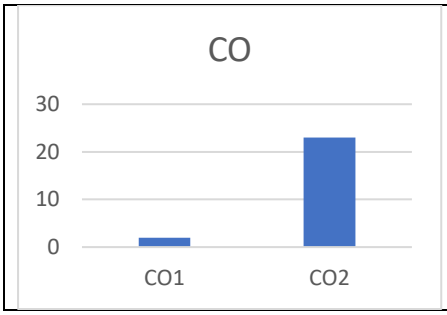
	q_1	q_5	q_6	q_7
c	1	3	2	3
d	2	1	3	1

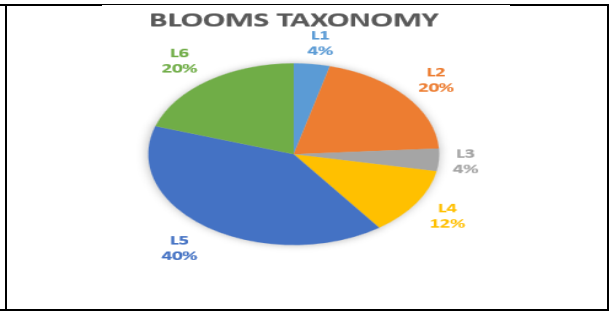
$\{q_1\}$ $\{q_5, q_7\}$ $\{q_6\}$

=) converged

Register number _____

	 Myhill Nerode method can also be used.					





Question Paper Setter

Approved by ~~Audit Professor~~/ Course Coordinator

Register number _____