Student Name:

University Roll No.: Printed Pages: 2

School of Engineering
First Theory Sessional Examination
Odd Semester (AS: 2024-25)

B. Tech: CSE (All Sections) [Year: III] [Semester : V]

Course Title: AUTOMATA THEORY AND FORMAL LANGUAGE Max Marks: 30

Course Code: BCS-3504 Time: 1*hrs*

SECTION 'A'

Q.N.1. Attempt all parts of the following:

		Course Objective	Marks
a)	Define string.	CO 1	1
b)	Explain Finite Automata.	CO 1	1
c)	Differentiate between DFA and NFA.	CO 1	1
d)	Explain Kleene's closure and Positive closure.	CO 1	1
e)	Design a regular expression that represent all string over the alphabet $\sum = \{a, b\}$, such that for every accepted string 2nd from right end is always b.	CO 2	1

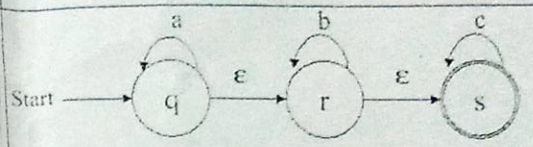
SECTION 'B'

Q.N.2. Attempt any two parts of the following:

		Course Objective	Marks
a)	Construct DFA that all binary strings where the number of 0's is divisible by 3 and the number of 1's is divisible by 2.	CO 1	7.5
b)	Construct an DFA equivalent to given NFA whose δ is given by- $\delta(q1,0) = \{q2, q3\}$, $\delta(q1,1) = \{q1\}$, $\delta(q2,0) = \{q1, q2\}$, $\delta(q2,1) = \{\varphi\}$ $\delta(q3,0) = \{q2\}$, $\delta(q3,1) = \{q1, q2\}$	CO 1	7.5
c)	Consider a DFA and convert it into regular expression using Arden's theorem. $\delta(A, a) = A$, $\delta(A, b) = b$, $\delta(B, a) = B$, $\delta(B, b) = B$ A is the initial state and B is the final state.	CO 2	7.5

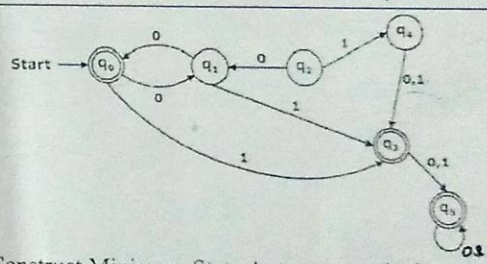
SECTION 'C'

Q.N.3. Attempt any one parts of the following:

		Course Objective	Marks
a)	 Convert the following NFA with ε moves to DFA without ε moves.	CO 2	10
b)	Construct a Moore Machine equivalent to given Mealy Machine?	CO 1	10

Present State / Next State

	a= 0		a = 1	
	State	Output	State	output
→q1	q1	1	q2	0
q2	q4	1	q4	1
q3	q2	1	q3	1
q4	q3	0	q1	1

c)  CO 1 10

Construct Minimum State Automata equivalent to given DFA?

Table 1: Mapping between COs and questions

COs	Questions Numbers	Total Marks
CO1	1.a, 1.b, 1.c, 1.d, 2.a, 2.b, 3.b, 3.c	39
CO2	1.e, 2.c, 3.a	18.5

09.10.2024