NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI – 620015
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.Tech (CSE) - Cycle Test 1 – January – May 2024
CSPC41– Automata and Formal languages

Semester: IV
Curriculum: NITTUGCSE20 **Max Marks: 20**
Date of Exam: 28th February 2024 **Time: 1 hour**

---

1. Design a finite automata for the following subsets of languages over {0,1}* (2) (CO1)
   a. The language of all strings such that the number of 1's in the string is 3 mod 4.
   b. The language of all strings containing both 11 and 010 as substrings.

2. Construct a DFA equivalent to the following ε-NFA by constructing an intermediate NFA. The input is defined as ({1, 2, 3, 4, 5, 6}, {a, b}, δ, 1, {1,6}) where δ is given by (6) (CO1)

State	a	b	ε
→ * 1	{2}	Φ	{4}
2	Φ	{3}	Φ
3	{1,3}	Φ	Φ
4	Φ	{5}	Φ
5	Φ	{6}	Φ
*6	Φ	{4}	Φ

3. Construct a ε-NFA for the following regular expression
   1*(0+10)*1* (2) (CO1)
4. Prove the intersection property of regular languages using an example (2) (CO5)
5. Prove that equivalent of states is transitive (2) (CO5)
6. Prove that if R is regular R? is also regular. (2) (CO5)
7. Construct a Mealy machine equivalent to the following Moore machine. (4) (CO1)

State	Next State		Output
	0	1	
→ A	B	C	1
B	D	C	0
C	C	B	1
D	A	D	1

--- Best Wishes ---