Theory of Automata – CS331
Midterm-I
23rd April 2024

Time: 90 Minutes   **Points:** 30

Note: There is only one page and three questions in total. Switch off your mobile phones. Electronic devices are prohibited. Each question carries ten marks.

[Q1] Construct a minimal DFA over alphabet $\Sigma = \{0, 1\}$ from the following state transition table.

States	Inputs	
	0	**1**
→ {A}	{A, B}	{B}
{B}	{A}	{C}
* {C}	{B}	{C}

[Q2] Construct a finite Mealy's automaton for a vending machine that gives four products (chocolate, orange juice, water, biscuit) as output. Other possible outputs can be the amount exceeding the cost of the product. One product can be selected at a time. The cost of chocolate and biscuits is 10 rupees whereas the cost of orange juice and water is 16 rupees. Consider {2, 4, 6, 8} coin denominations for the required amount. The following conditions must be fulfilled:

1. A cancel C should return the amount in coins accepted by the machine in any current state.

[Q3] Construct a minimal DFA for the following language:

Language = $\{a^m b^n \mid m + n \text{ is even }\}$