

## Quiz 1: CS 331 Formal Language and Automata Theory - 10 Marks MO/25 SET A

**Instructions:** Solve all questions. Show your work where applicable

### Question 1 (2 marks)

Construct a DFA that accepts all strings from the language  $L = \{\text{strings of size divisible by 3}\}$ . Draw the state diagram and provide the transition table.

### Question 2 (2 marks)

Given the following DFA, determine whether the strings "1011" and "1010" are accepted or rejected. Show the path of computation for each string.

*State diagram:*

- States:  $\{q_0, q_1, q_2\}$                       Initial state:  $q_0$                       Final state:  $q_2$
- Transitions:
  - $\delta(q_0, 0) = q_0, \delta(q_0, 1) = q_1$
  - $\delta(q_1, 0) = q_2, \delta(q_1, 1) = q_0$
  - $\delta(q_2, 0) = q_2, \delta(q_2, 1) = q_2$

### Question 3 (1 mark)

In a DFA with alphabet  $\Sigma = \{a, b, c\}$ , what is the maximum number of transitions that can originate from any single state?

**Question 4 (5 mark)** Find the Minimum Automata: (Use Table Filling / Equivalence method)

State / $\Sigma$	a	b
$\rightarrow q_0$	$q_1$	$q_2$
$q_1$	$q_4$	$q_3$
$q_2$	$q_4$	$q_3$
$*q_3$	$q_5$	$q_6$
$*q_4$	$q_7$	$q_6$
$q_5$	$q_3$	$q_6$
$q_6$	$q_6$	$q_6$
$q_7$	$q_4$	$q_6$