# SCHOOL OF INFORMATION TECHNOLOGY AND ENGINEERING

## CONTINUOUS ASSESSMENT TEST – I – WINTER SEMESTER 2019-2020

Programme Name & Branch: B.Tech.IT

Course Name Code: ITE1006

Course Name: Theory of Computation

Faculty Name(s): Dr. Swarna Priya RM, Dr. Viswanathan P, Dr. Harshitha Patel

Exam Duration: 90 mins    Maximum Marks: 50

**General instruction(s):**

*Answer ALL Questions*

### Section A (4*5=20)
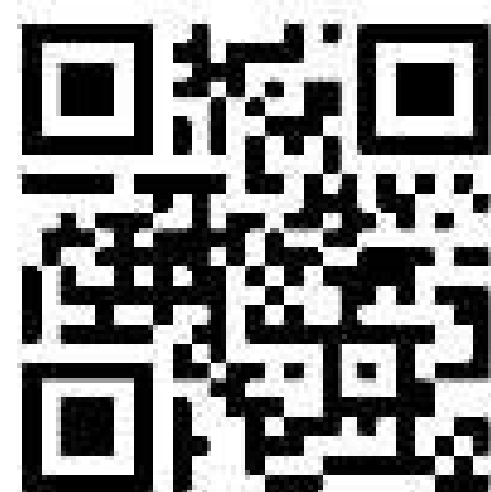
1. Give the state diagram and transition table of DFA recognizing the language  L = {w/w is divisible by 3 or ends with 00}.

2. (i) Prove by mathematical induction : For n≥1, $2 + 2^2 + 2^3 + 2^4 + \ldots + 2^n = 2^{n+1} - 2$   (3 Marks)

   (ii) For the language L = {aa, b} over the set $\sum = \{a,b\}$. Find $L^2$ and $L^3$.   (2 Marks)
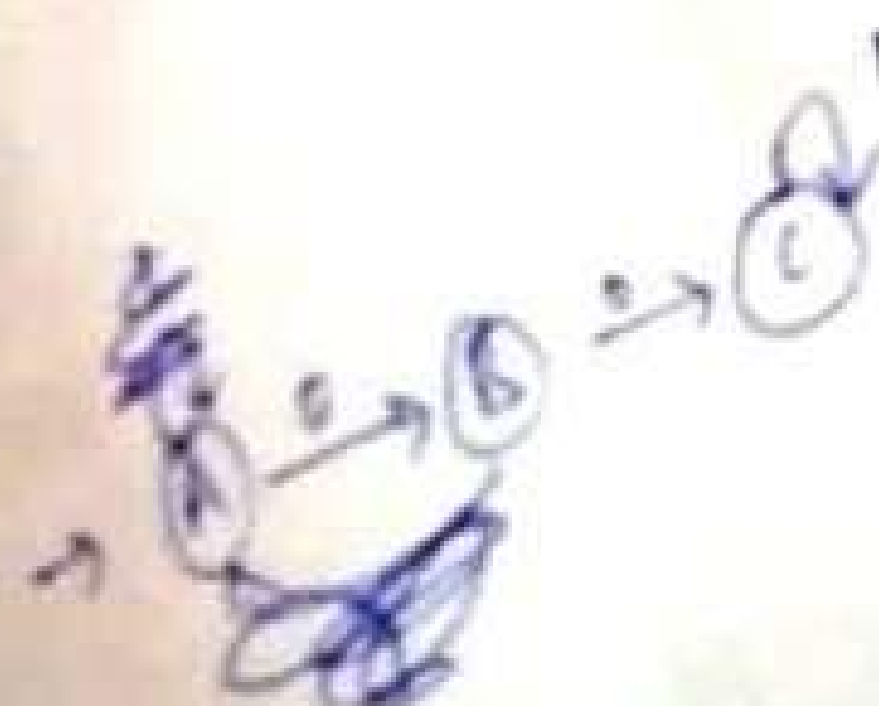
3. Design a NFA Machine over an alphabet $\sum = \{0, 1\}$ which accepts the language {w $\in \sum^* \mid$ w contains at least two 0's, or exactly two 1's}. Draw transition table and transition diagram.

4. Convert the given Mealy machine into Moore machine.

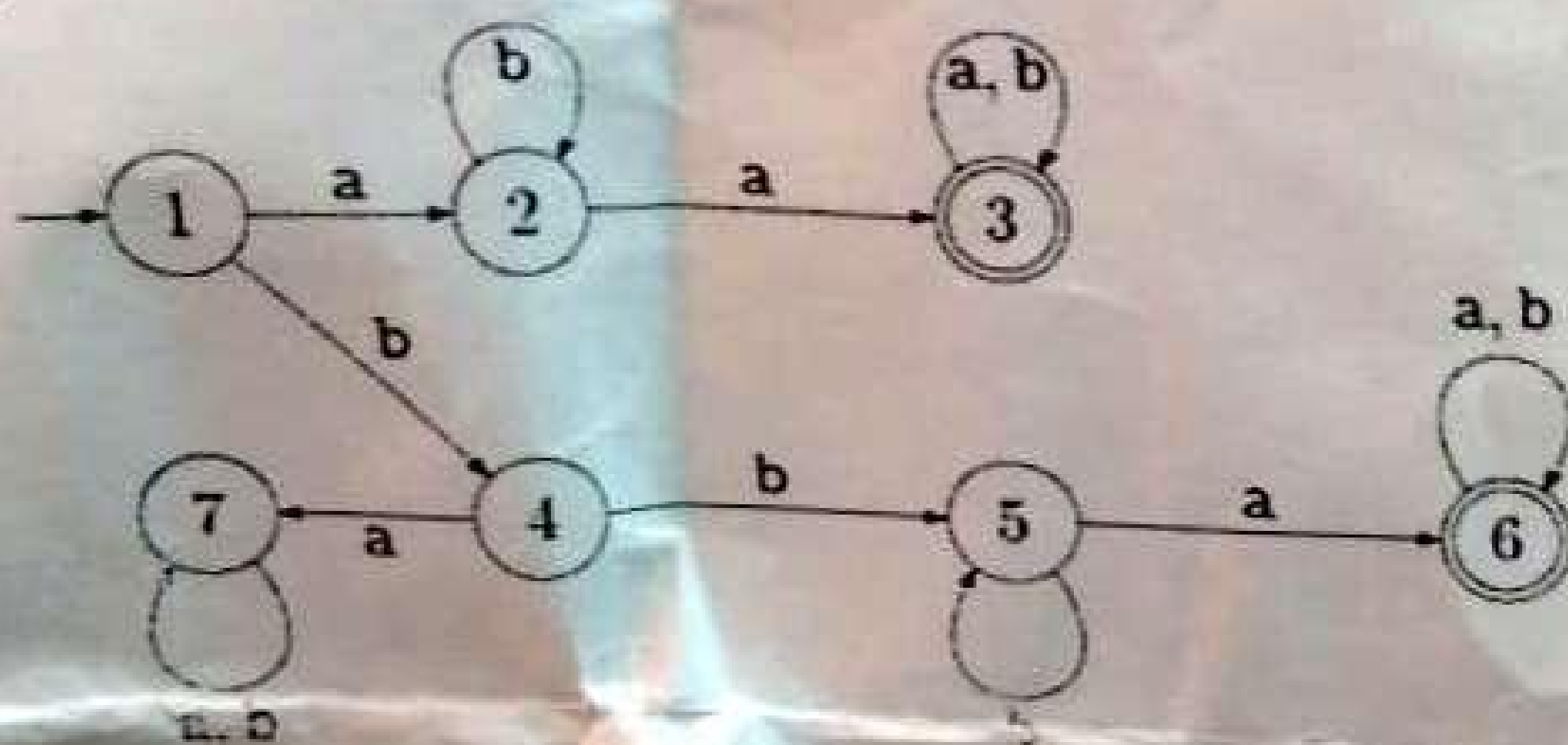| Present State | Next State | | | |
| --- | --- | --- | --- | --- |
| | a=0 | | a=1 | |
| | State | Output | State | Output |
| → q1 | q3 | 0 | q2 | 0 |
| q2 | q1 | 1 | q4 | 0 |
| q3 | q2 | 1 | q1 | 1 |
| q4 | q4 | 1 | q3 | 0 |

5. For a NFA with ∈ moves shown below determine the strings accepted by it. Construct an equivalent NFA without ∈ moves.

| States | Input symbols | | | |
|---|---|---|---|---|
| | 0 | 1 | 2 | ∈ |
| → s0 | {s0} | - | - | {s1, s2} |
| s1 | - | {s2} | - | {s3} |
| s2 | - | {s3} | - | - |
| *s3 | - | - | {s3} | - |

6. Construct minimized DFA for the following transition diagram using Equivalence Partitioning.



7. Design a NFA for the language: L = (ab)* (ba)* U aa*. Convert this into equivalent DFA.