

School of Computer Science Engineering and Information Systems

Fall Semester 2024-2025

Continuous Assessment Test – I

Programme Name & Branch: B.Tech. (IT)

Course Name & code: Theory of Computation & BITE306L

Class Number (s): VL2024250103397, VL2024250103393, VL2024250103390

Faculty Name (s): Prof Dharmendra Singh Rajput, Prof Chiranji Lal Chowdhary, Dr Uma Maheshwari G

Exam Duration: 90 Min.

Maximum Marks: 50

1. a) Differentiate between DFA and NFA with their State transition diagram. [5M]
b) Construct DFA to recognize odd number of 1's and even number of 0's? [5M]
2. a) Given that L_1 and L_2 are regular languages, is $L_1 \cup L_2$ also a regular language. Justify. [2.5M]
b) If L is a regular language over alphabet Σ , then complementation of L is $\bar{L} = \Sigma^* - L$. [2.5M]
Explain with reasons.
c) Given that L_1 and L_2 are regular languages, is $L_1 \cap L_2$ also a regular language. Justify. [2.5M]
d) If $L_1 = \{a, b\}$ and $L_2 = \{aa, bb\}$, what would be the resulting concatenated language $L = L_1 \cdot L_2$? [2.5M]
3. Deduce the following ϵ -NFA to DFA. [10M]

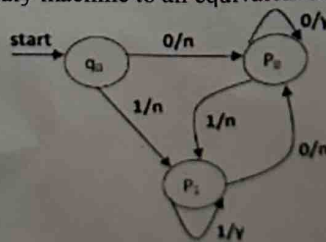
states	ϵ	a	b	c
$\rightarrow p$	$\{q, r\}$	$\emptyset$	$\{q\}$	$\{q, r\}$
q	$\emptyset$	$\{p\}$	$\{r\}$	$\{q\}$
$*r$	$\emptyset$	$\emptyset$	$\emptyset$	$\{r\}$

4. Minimize the DFA whose transition table is given below: [10M]

states	0	1
$\rightarrow q_0$	q_1	q_3
q_1	q_2	q_4
q_2	q_3	q_2
$*q_3$	q_4	q_5
$*q_4$	q_3	q_4
$*q_5$	q_4	q_5
q_6	q_6	q_1

Starting State: q_0 and Final State: $\{q_3, q_4, q_5\}$.

5. a) Convert the following Mealy machine to an equivalent Moore machine. [5M]



- b) Design a Mealy Machine accepting the language consisting of Strings from Σ^* , where $\Sigma = \{a, b\}$ and the string should end with either 'aa' or 'bb'. The given output alphabet is $\Delta = \{0, 1\}$. [5M]