

447

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2025

B.Tech-III Semester (CSE)

COURSE CODE (CREDITS): 25B11CI315 (3)

MAX. MARKS: 15

COURSE NAME: Theory of Computation

COURSE INSTRUCTORS: ARV\*, MNK, NSA, RMS, SKS, SMA

MAX. TIME: 1 Hour

**Note:** (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	CO	Marks
Q1	<p>Construct an equivalent Deterministic Finite Automaton (DFA) as shown in the following figure, consisting of states: <math>Q = \{q_0, q_1, q_2\}</math>, and Alphabet: <math>\Sigma = \{a, b\}</math>. Here, <math>\epsilon</math> denotes the empty string transition.</p>	2	3
Q2	<p>Answer the following along with proper justifications: How many numbers of states are present in the <b>Minimal DFA</b> that accepts all strings over alphabet <math>\{a, b\}</math> where</p> <ul style="list-style-type: none"> <li>(a) Length of string is at most 6.</li> <li>(b) The number of a's is exactly 3 and the number of b's is at least 3 in the string.</li> <li>(c) 4'th symbol is 'a' while reading the string from RHS.</li> </ul>	2	3
Q3.	Design a DFA that accepts the set of all strings over $\{a, b\}$ such that the second alphabet from the right-hand side is 'a'.	2	3
Q4.	Construct the regular expression corresponding to the Finite Automata given in the following figure.	1	3
Q5	Represent the language over $\Sigma = \{0, 1\}$ using a regular expression containing all possible combinations of 0's and 1's, but not having two consecutive 0's.	1	3