JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-3 EXAMINATION DECEMBER 2025

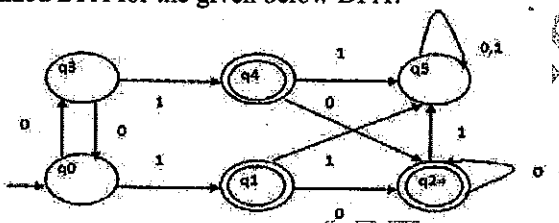
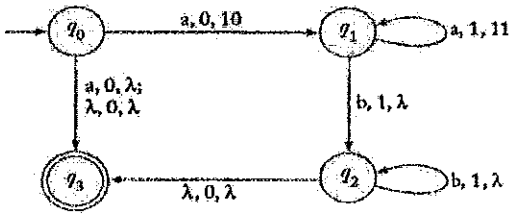
B.Tech- Vth Semester

Course Code: 18B11CI513 (3) Max Marks: **35**

Course Name: FORMAL LANGUAGES & AUTOMATA THEORY

Course Instructor: **Dr. Praveen Modi**, Dr. Rakesh Kanji, Dr. Amit Jhakad, Mr. Faisal Firdous Max Time: **02:00 Hr**

***Note:** All questions are compulsory. Marks are indicated against each question in Marks column. Write the answer of the question belonging to the same part in the same order.*

Q.No	Question	CO	Marks
Q1.	a. Find the minimized DFA for the given below DFA? 	3	4
	b. Design a DFA for the strings over $\sum(0,1)$ where L = {w: |w| mod3 ≠ 0}?	2	3
Q2	a. Write the context free grammar of the strings over $\sum(0,1)$ for the language in which the starting and ending symbols are the same.	4	3
	b. Write the context free grammar for the strings over $\sum(a,b,c,d)$ for the language L = $\{a^n b^m c^m d^n \mid n, m \geq 1\}$?	4	3
	c. Derive the string w "abbbaabbaba" using LMD technique for the grammar G({S, A, B}, {a, b}, P, {s}) with the following production set P. S → abB A → aaBb | ∈ B → bbAa	4	2
Q3	a. Design a Push Down Automata over $\sum(a,b)$ for language L = $\{WW^R \mid W^R$ is reverse string of W}?	6	4
	b. Identify the language of following PDA ($Q(q_0q_1q_2q_3), \sum(a,b), \Gamma(0,1)\ \partial, q_0, \{q_3\}$) where λ is null string and ∂ is the transition function? 	7	3

Q4.	a. Design the Turing machine $\sum(a, b, c)$ for language L $=\{a^n cb^n \mid n \geq 1\}$	8	5
	b. Write the transition function for following Turing machine. 1. Non- Deterministic 2. Multi-Tape	9	2
Q5.	a. Identify the **decidability** and **undecidability** for following problems? 1. Whether L= {∈} is accepted by DFA, PDA, and Turing Machine. 2. Whether the given context free language is ambiguous.	10	3 1
	b. Write the name of automata is used for following type of languages? 1. Recursive Language 2. Type 1 3. Type 2 4. Type 3	9	2