

Jaypee University of Engineering & Technology, Guna

T-2 (Odd Semester 2022)

18B11CI511 – Theory of Computation

Maximum Marks: 25

Maximum Duration: 1 Hour 30 Minutes

Notes:

1. This question paper has five questions.
2. Write relevant answers only.
3. Do not write anything on question paper (Except Er. No.).
4. (Marks are indicated in square bracket.)

	Marks	CO Number(s) as per course description
Q1. Design a deterministic finite automata (DFA) to accept the intersection of the $L_1 = (a+b)^*a$ and $L_2 = (a+b)^*b$ that is for $L_1 \cap L_2$. Explain every step used to find $L_1 \cap L_2$.	[05]	CO1
Q2. Determine the grammar that does not generate all string over $\{0, 1\}$ ending with substring 11. Give proper justification of each production rule used in generating the given string.	[05]	CO2
Q3. If $L_1 = \{a^n b c^n \mid n \geq 0\}$ and $L_2 = \{a^m b^{2m} \mid m \geq 1\}$, find a grammar G for $L_a(G)$ and $L_b(G)$ such that $L_a(G) = L_2 L_1$ and $L_b(G) = (L_2 + L_1)^*$.	[05]	CO2
Q4. Show that the given set $L(G)$ is not regular by using pumping lemma. $L(G) = \{a^n b^{2n} \mid n > 0\}$	[05]	CO3
Q5. Consider the grammar $G = (V, T, S, P)$ with $V = \{S, I\}$, $T = \{a, b, c, +, *, (,)\}$, and productions. $S \rightarrow I$, $S \rightarrow S + S$, $S \rightarrow S * S$, $S \rightarrow (S)$, $I \rightarrow a b c$ Check the ambiguity of the grammar for the string $a+b*c$ and evaluate the derivation tree of the given string for the value of $a=5$, $b=6$ and $c=7$.	[05]	CO3