Indian Institute of Information Technology Chittoor

Theory of Computation

Mid-1, 2016m

Note: This is a **closed book** and **closed notes** exam. Ordinary calculators are allowed.

Max Marks = 15. Duration = 90 Minutes.

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1. While it is true that union of two regular languages is a regular language, the following statement is false. "Union of two non-regular languages is a non-regular language. " Can you disprove this statement? ***(2 Marks)***

2. Let $L_1, L_2, and\ L_3$ are languages over an alphabet Σ. Consider the statement : If L_1, L_3 are regular and $L_1 \subseteq L_2 \subseteq L_3$, then L_2 is regular. Prove or disprove this statement. ***(3 Marks)***

3. Show that $L = \{a^m b^n | m > n\}$ is a non-regular language. ***(3 Marks)***

4. (a) Give a DFA D1 for binary strings divisible by 3. ***(2 Marks)***

(b) Give a DFA D2 for binary strings not divisible by 4. ***(2 Marks)***

(c) construct a product DFA for DFAs D1 and D2, and thus give a DFA for binary strings divisible by 3, but not by 4. ***(3 Marks)***
