St. JOSEPH'S COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 620 002

SEMESTER EXAMINATIONS – APRIL 2015

TIME: 3 Hrs. **MAXIMUM MARKS: 100**

SEM	SET	PAPER CODE	TITLE OF THE PAPER
IV	2013	12PMA4202A	AUTOMATA THEORY

SECTION – A

Answer all the questions: **10 x 2 = 20**

1. Define a finite automation.

2. Define regular language.

3. If $L_1 = \{10, 1\}$ and $L_2 = \{011, 11\}$, find $L_1 L_2$.

4. State the relationship between derivation trees and derivations.

5. What is a stack?

6. Define accepted languages.

7. Write the regular – expression construction rules.

8. Define a recognizer for a language.

9. Define a parser for a grammar.

10. What are the four possible actions a shift – reduce parser can make?

SECTION – B

Answer all the questions: **5 x 7 = 35**

11. a. Explain non deterministic finite automaton with an example.

OR

b. Let $M = (\{q_0, q_1\}, \{0, 1\}, \delta, q_0, \{q_1\}$ be an NFA where $\delta(q_0, 0) = \{q_0, q_1\}$, $\delta(q_0 -1) = \{q_1\}$, $\delta(q_1, 0) = \phi$ and $\delta(q_1, 1) = \{q_0, q_1\}$. Construct a DFA $M' = (Q, \{0,1\}, \delta', [q_0], F)$ accepting $L(M)$.

12. a. If L is accepted by a DFA, prove that L is denoted by a regular expression.

OR

b. Explain derivation tree with an example.

13. a. Give a PDA that accepts $\{ww^R \mid w \text{ in } (0+1)^*\}$.

OR

b. If L is $L(M_2)$ for some PDA M_2, prove that L is $N(M_1)$ for some PDA M_1.

14. a. Write the need for lexical analysis.

OR

b. Write an algorithm for minimizing the number of states of a DFA.

15. a. Write an algorithm for computing operator – precedence relations.

OR

b. Write an algorithm for constructing a predictive passing table.

SECTION – C

Answer any THREE questions: **3 x 15 = 45**

16. If L is a set accepted by a non deterministic finite automaton, prove that there exists a deterministic finite automaton that accepts L.

17. State and prove the theorem on Chomsky normal form.

18. If L is N(M) for some PDA M, prove that L is a context free language.

19. Write the algorithm for constructing an NFA from a regular expression.

20. Explain top-down passing with example and write some of its difficulties.

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