MCA–420 **MCA–10/ PGDCA–08**

M.C.A. DEGREE/P.G.D.C.A. EXAMINATION – JUNE 2009.

Second Semester / First Year

THEORY OF COMPUTER SCIENCE

Time : 3 hours Maximum marks : 75

PART A — ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

1. Prove that $R(S+T) = RS + RT$.

2. Show that the language $L = \{0^m 1^m ; m > 0\}$ is not regular.

3. Write short note on non-context free language.

4. Explain briefly universal turing machine.

5. Show that plus-prod is primitive recursive.

6. Show that $n^2 + 3\log n = O(n^2)$.

7. $f(x) = x^2 + 3x + 1,\ g(x) = 2x - 3$ find
$f \circ g,\ g \circ f,\ f \circ f,\ g \circ g$.

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

8. If the string $\alpha = abab$ accepted by the finite state automata? Justify.

9. Construct NDFA for the regular expression $r = (a / b)^* ab$ and convert it into DFA.

10. Construct the grammar for the language

$L(G) = \{a^n b a^n / n \geq 1\}$.

11. Design Turing machine to accept the language $L = \{b^n d^n / n \geq 1\}$.

12. Explain various types of problems.

13. Discuss about pushdown automata.

14. Discuss about the application of context free grammar.

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