

MCA-135**MCA-10/
PGDCA-08**

**M.C.A. DEGREE/PGDCA EXAMINATION –
JANUARY 2009.**

Second Semester/First Year

THEORY OF COMPUTER SCIENCE

Time : 3 hours

Maximum marks : 75

Answer for 5 marks question should not exceed
2 pages.

Answer for 10 marks questions should not exceed
5 pages.

PART A — ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

1. If $u = ababb$ and $V = baa$ find uv, vu, uu, vv and uvv .
2. Give an NFA which accepts all the strings starting with ab over $\{a, b\}$
3. Find a grammar for $\{a^m b^n / m, n \in N, n > M\}$.

4. Design a TM that recognizes the language of all strings of even lengths over the alphabet $\{a, b\}$.
5. Define NDTM. Explain NDTM with transition diagram.
6. $g(x) = x^2$, $h(x) = x + 3$ find $h \circ g$, $g \circ h$.
7. Show that $n! = O(n^n)$.

PART B — ($5 \times 10 = 50$ marks)

Answer any FIVE questions.

8. Show that $R + RS^*S = a^*bs^*$ where $R = b + aa^*b$ and S is any regular expression.
9. Construct an NFA accepting $\{01, 10\}$.
10. Explain context Free grammar.
11. Explain how TM can be used as computer of functions.
12. Construct an NDTM to accept the language $\{a^n b^m, n \geq 1, m \geq 0\}$.

13. A function $f: N \rightarrow N$ is defined as $f(0) = \xi()$ and $f(y) = \sigma.\sigma.\sigma f(y-1)$ what is the value of $f(4)$?

14. Explain application of regular expressions.
