

Registration No. :

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Total number of printed pages – 2

MCA
MCC 204

Special Examination – 2012

THEORY OF COMPUTATION

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any **five** from the rest.

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2 × 10
 - (a) What is Chomsky's hierarchy ?
 - (b) State the mathematical definition of DFA.
 - (c) Define Context Free grammar.
 - (d) What is configuration of a Turing machine ?
 - (e) When do we say that a function is Turing – computable ?
 - (f) When do we say that a function is Primitive recursive ?
 - (g) What is PDA ?
 - (h) Define the class NP.
 - (i) Define the concept of validity in propositional calculus.
 - (j) Construct truth tables for the following formula : $(A \leftrightarrow (B \leftrightarrow A))$
2.
 - (a) Prove that, for every non deterministic finite automation there is an equivalent deterministic finite automation. 5
 - (b) Construct an NFA with ϵ transitions to accept line comment statement in C programming. 5

P.T.O.

3. (a) Show that the class of Languages accepted by pushdown automata is exactly the class of context-free languages. 5
- (b) Construct context free Grammar that generate the language 5
 $\{wcw^R \mid w \in \{a, b\}^*\}$
4. (a) Describe the Turing Machine which shifts a string w containing no blanks to one cell to the left. 5
- (b) Construct a Turing Machine that accepts the Languages a^*ba^*b . 5
5. (a) Describe the method of Godelization. 5
- (b) Show that the function $f(n) = n!$ is primitive recursive. 5
6. (a) What is halting problem ? Explain. 5
- (b) Show that any finite set is Turing-decidable. 5
7. (a) Let L be an NP-complete language. Then $P = NP$ if and only if $L \in P$. 5
- (b) Show that Travelling salesman problem is NP-complete. 5
8. (a) Show that the following formula of propositional calculus is a Tautology. 5
 $((P \rightarrow Q) \rightarrow R) \rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R))$
- (b) Describe resolution in Predicate calculus. 5