Unit III

5. What is pushdown automata ? Design a PDA for the language L = $\{wcw^T \mid w$ is astring of a's and b's$\}\{w^T$ is transpose of $w\}$. **15**

6. Explain the working of turing machine with a diagram ? Design a turing machine for the language given L = $\{0^n \mid n$ is a multiple of 3$\}$. **15**

Unit IV

7. What is meant by Chomsky classification of languages ? How are different language related to each other ? **15**

8. Write short notes on the following : **7½×2**

(a) Primitive recursive functions

(b) Unrestricted grammars.

DD-685

M.C.A. EXAMINATION, Dec. 2018

(Fourth Semester)

(B. Scheme) (Re-appear Only)

MCA552

THEORY OF COMPUTATION

Time : 3 *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) What are finite state systems ? Differentiate between NDFA and DFA ? **8**

(b) Design a FA for all strings over {0, 1} such that number of O's is multiple of 3 and number of 1's is multiple of 4 ? **7**

2. (a) Design a mealy machine for generating one's complement of a binary number. **8**

(b) Write a regular expression for the transition system given below using Arden's theorem. q_2 in the final state for the system. **7**

state/input	**0**	**1**
$\rightarrow q_0$	q_1	q_0
q_1	q_1	q_2
q_2	q_1	q_1

Unit II

3. (a) Construct a minimum state automation for the finite automata given below. q_5 is the final state : **10**

state/input	***a***	***b***
$\rightarrow q_0$	q_1	q_2
q_1	q_1	q_2
q_2	q_3	q_4
q_3	q_3	q_4
q_4	q_4	q_5
q_5	q_2	q_3

(b) What is meant by Chomsky normal form ? **5**

4. (a) Prove using pumping lemma that the given language L is not regular : L = $\{a^p \mid p$ is a prime number$\}$. **10**

(b) What is meant by ambiguous grammar ? Explain with an example. **5**