



PG – 266

III Semester M.C.A. Examination, January 2016
(CBCS)
COMPUTER SCIENCE
MCA 303 : Theory of Computation

Time : 3 Hours

Max. Marks : 70

- Instructions :** 1) Answer any **five** questions from Section – A, each carries **six** marks.
2) Any **four** questions from Section – B, each carries **10** marks.

SECTION – A

Answer any 5 questions. Each question carries 6 marks. (5x 6 = 30)

1. What is finite automata? What are the applications of finite Automata? 6
2. Define NFA and ϵ -NFA. Explain with suitable example. 6
3. Define Regular Expression. Explain the meaning of the regular expression $(a+b)^*$. 6
4. Define context free grammar. Show that if L_1 and L_2 are context free languages then $L_1 \cup L_2$ is also context free. 6
5. Construct a pushdown automata that accepts the following language.
 $L_{01} = \{0^n 1^n | n \geq 1\}$ and illustrate its working. 6
6. Define Turing Machine. Explain Turing Machine model with its components. 6
7. Write a note on pumping lemma for regular languages. 6



8. a) Define μ -Recursive function. 2

b) Convert the following CFG to CNF 4

$$S \rightarrow 0A|1B$$

$$A \rightarrow 0AA|1S|1$$

$$B \rightarrow 1BB|0S|0$$

SECTION - B

Answer any 4 questions. Each question carries 10 marks. (4x10= 40)

9. Construct a Deterministic finite Automation (DFA) for the following :

a) The String Ends with 10. 3

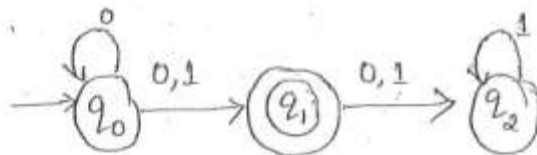
b) Even number of 0's and odd number of 1's. 3

c) To accept the language 4

$$L = \{W : |W| \bmod 4 = 0\} \text{ on } \Sigma = \{0,1\}$$

10. a) Explain parse tree and its properties. 4

b) Convert the following NFA into an equivalent DFA : 6



11. a) Define PDA and Instantaneous description of PDA. 4

b) Obtain a PDA to accept the language $L(M) = \{WCWR / W \in (a+b)^*\}$ where WR is the reverse of W and hence say whether its is a Deterministic PDA or not. 6