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. **(5× 6 = 30)**

1. What is finite automata ? What are the applications of finite Automata ? 49 6

2. Define NFA and ε-NFA. Explain with suitable example. 49, 53 6

3. Define Regular Expression. Explain the meaning of the regular expression $(a+b)^*$. 90, 92 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. 178 6

5. Construct a pushdown automata that accepts the following language. 6

   $L_{01} = \{0^n 1^n | n \geq 1\}$ and illustrate its working.

6. Define Turing Machine. Explain Turing Machine model with its components. 6 194, 196

7. Write a note on pumping lemma for regular languages. 109 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

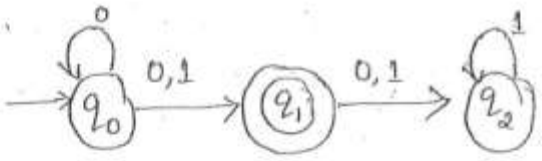
b) Even number of 0's and odd number of 1's. 3

c) To accept the language 4

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

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