PJ – 580

III Semester M.C.A. Examination, January 2019
(CBCS Scheme)
MCA 303 : THEORY OF COMPUTATION

Time : 3 Hours Max. Marks : 70

Instructions : *1) Part – **A** : Answer **any 5** questions **(5×6=30)**.*
*2) Part – **B** : Answer **any 4** questions **(4×10=40)**.*

PART – A

Answer **any five full** questions. **(5×6=30)**

1. What is finite automata ? What are its applications ?
2. Define NFA and E-NFA. Explain with suitable example.
3. Explain Chomsky's Hierarchy of grammar.
4. Construct a DFA
   a) String starts with ab or ba. **(3+3)**
   b) To accept even number of 0's and even number of 1's.
5. Design a DFA to accept decimal strings divisible by 5.
6. Eliminate unit productions from the grammar
   $S \rightarrow Aa|B|Ca$
   $B \rightarrow aB|b$
   $C \rightarrow Db/D$
   $D \rightarrow E|d$
   $E \rightarrow ab$
7. Write a note on pumping lemma for regular languages.
8. Explain primitive recursive functions and μ–recursive functions.

P.T.O.

PART – B

Answer **any four full** questions. **(4×10=40)**

9. Find DFA equivalent to the following :
   $N = \{(q_0, q_1, q_2), (a, b), \delta, q_0, (q_2)\}$
   where δ is defined as follows :

	a	b
q_0	$\{q_0, q_1\}$	q_2
q_1	q_0	q_1
q_2	–	$\{q_0, q_1\}$

10. a) Obtain an NFA for the regular expression $ab(a + b)^*a$. **(5+5)**
    b) Show that $L = \{0^n 1^n \mid n \geq 1\}$ is not regular.

11. a) Explain Instantaneous description of PDA. **(4+6)**
    b) Obtain a Turing machine to accept the language $L = \{0^n 1^n 2^n$, where $n \geq 1\}$.

12. Find a CFG without E – productions, unit productions and useless productions equivalent to the grammar defined by
    $S \rightarrow aA|a|B|C$
    $A \rightarrow aB|E$
    $B \rightarrow aA$
    $C \rightarrow cCD$
    $D \rightarrow abd$
    Also express the simplified grammar in CNF.

13. Find the minimized DFA from the given transition table.

	0	1
q_0	q_1	q_2
q_1	q_0	q_2
q_2	q_3	q_3
q_3	q_3	q_3

14. Write short notes on the following : **(5+5)**
    a) Cook's Theorem
    b) NP – Completeness.

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 ? 47 **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. 169 **6**

P.T.O.

8. a) Define μ-Recursive function. new notes 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. **(4×10= 40)**

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

a) The String Ends with 10. 3

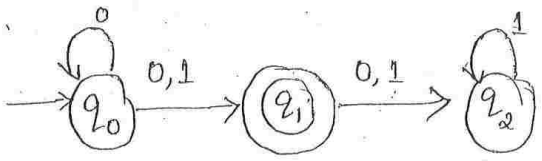
b) Even number of 0's and odd number of 1's. 3

c) To accept the language 4

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

10. a) Explain parse tree and its properties. 133 4

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



11. a) Define PDA and Instantaneous description of PDA. 159 4

b) Obtain a PDA to accept the language $L(M) = \{WCWR / W\varepsilon(a+b)^*\}$ where WR is the reverse of W and hence say whether its is a Deterministic PDA or not . 16 6