



K19P 1374

Reg. No. :

Name :

**III Semester Master of Computer Application (M.C.A.)/ M.C.A. Lateral Entry
Degree (Reg./Suppl./Imp.) Examination, November - 2019
(2014 Admission Onwards)**

MCA 3C15 : THEORY OF COMPUTATION

Time : 3 Hours

Max. Marks : 80

SECTION - A

Answer any **TEN** questions. Each question carries **THREE** marks.

(10x3=30)

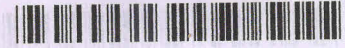
1. Define finite automata and specify its application.
2. Find grammar for $\Sigma = \{a,b\}$ that generates the set of all strings with no more than three a's
3. Define regular expression
4. Explain ambiguous Grammar
5. Define right and left linear grammars
6. Write a note on Derivation trees
7. Explain pushdown automata
8. Write a note on removing useless productions with example
9. Define Turing Machine
10. State the pumping lemma for linear languages
11. Write a note on off-line turing machine
12. Write a note on Linear Bounded Automata

SECTION - B

Answer all questions. Each question carries ten marks.

13. a) i) Find a DFA that accepts all the strings on $\{0, 1\}$, except those containing the substring 001. **(5+5)**
ii) Explain the procedure to reduce the Number of States in DFA
- (OR)**
- b) i) Define Non Deterministic finite accepter (NFA) **(3+7)**

P.T.O.



- ii) Construct a NFA that accepts the set of all strings $\{a,b\}$ ending with "aba" as substring and construct DFA
14. a) i) State and prove Pumping Lemma (PL) for Regular Languages (7+3)
- ii) With an example explain ambiguous grammars
- (OR)
- b) i) Define context free grammars and find the context free grammars for the following languages (5+5)
- $$L = \{w \in \{a,b\}^* : n_a(w) \neq n_b(w)\}$$
- ii) Prove that family of regular languages is closed under union and intersection
15. a) Convert the grammar (10)
- $$S \rightarrow ABb|a$$
- $$A \rightarrow aaA|B$$
- $$B \rightarrow bAb$$
- Into Greibach Normal Form
- (OR)
- b) Construct an NPDA for accepting the language (10)
- $$L = \{ww^R : w \in \{a, b\}^+\}$$
16. a) Show that the family of context free languages is closed under union, concatenation and star closure (10)
- (OR)
- b) Construct TM for (10)
- $$L = \{wcw^R \mid w \in (a+b)^* \text{ \& } w^R \text{ represents reverse of } w\}$$
17. a) Explain:- (5+5)
- i. Nondeterministic Turing Machine
- ii. Universal Turing Machine
- (OR)
- b) Explain Turing machine halting problem with an example and prove that is undecidable. (10)