

2053  
B.E. (Information Technology)  
Sixth Semester  
PCIT-601: Theory of Computation

Time allowed: 3 Hours

Max. Marks: 50

**NOTE:** Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- a) Define automata and its applications?
- b) Discuss an example of a language accepted by NPDA but not DPDA.
- c) Differentiate between mealy and moore machine?
- d) What is undecidability?
- e) An identifier in an programming language consists of up to six letters and digits, of which the first character must be a letter. Derive a regular expression for the identifier. (5x2)

**UNIT - I**

- II. Analyze the languages proposed by chomsky with the help of examples. (10)
- III. a) Design a DFA that accepts strings baa, ab and abb and no other strings of length longer or shorter.  
b) The transition table of NFA (M) is defined by table below. Construct DFA equivalent to this NFA.

	0	1	2
Q0	Q1Q4	Q4	Q2Q3
Q1		Q4	
Q2			Q2Q3
Q3 (Final State)		Q4	
Q4			

(2x5)

- IV. a) Give the statement of pumping lemma for regular languages and using it show that the language  $L = \{0^m 1^n \mid m \text{ and } n \geq 1\}$  is regular or not  
b) State and Prove Arden's Theorem. (2x5)

P.T.O.

(2)

**UNIT - II**

- V. a) Convert the following CFG with unit productions into Chomsky Normal Form  
S  $\rightarrow$  AB  
A  $\rightarrow$  bAA|aS|b  
B  $\rightarrow$  aBB|bS|b
- b) Design turing machine that accepts the language of all strings which contain aba as a string. (2x5)
- VI. Design a PDA for  $L = \{0^m 1^n \mid m + n \text{ is even}\}$ . (10)
- VII. Write notes on the following:-
- a) Recursively Enumerable Languages
- b) Universal Turing Machine (2x5)

x-x-x