

1128
B. E. (Information Technology)
Fifth Semester
ITE-546: 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) How many DFA's exists with two states over input alphabet {0,1}
 - b) State true or false and why: There exists a regular language A such that for all languages B, $A \cap B$ is regular.
 - c) What is the basic limitation of finite automata?
 - d) Given an arbitrary non-deterministic finite automaton (NFA) with N states. What is the least of the maximum number of states in an equivalent minimized DFA?
 - e) A minimum state deterministic finite automaton accepting the language $L = \{w \mid w \in \{0,1\}^*, \text{ number of 0s and 1s in } w \text{ are divisible by 3 and 5, respectively}\}$, has how many states?
 - f) State the Arden's theorem.
 - g) What is a recursive enumerable language?
 - h) What is meant by top down parsing?
 - i) Define the term 'undecidability'.
 - j) What is a Mealy machine? (10x1)

UNIT - I

- II. a) Find a finite automaton that accepts bit strings whose last five bits include a 1. (5)
- b) Let w be any string of length n is $\{0,1\}^*$. Let L be the set of all substrings of w. What is the minimum number of states in a non-deterministic finite automaton that accepts L? (5,5)
- III. Discuss how non regular languages can be identified using pumping lemma. (10)
- IV. Discuss NFA and DFA properties. How can a NFA be converted to a DFA? (10)

P.T.O.

UNIT - II

- V. a) Write a CFG, which generates palindrome for binary numbers.
b) State the various properties of a CFL. (5,5)
- VI. Discuss Chomsky's four types of grammars, the class of language it generates, the type of automaton that recognizes it, and the form its rules must have. (10)
- VII. Write short notes on:-
a) Universal Turing Machine
b) Closure properties of recursively enumerable languages (5,5)

x-x-x