

Code No: 134BD**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech II Year II Semester Examinations, December - 2019****FORMAL LANGUAGES AND AUTOMATA THEORY****(Common to CSE, IT)****Time: 3 Hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b as sub questions.

PART – A**(25 Marks)**

- 1.a) Define Non-deterministic Finite Automata. [2]
- b) What is the mathematical model of finite automata? [3]
- c) What are the Applications of the Pumping Lemma? [2]
- d) What are the Decision Properties of Regular Languages? [3]
- e) Define context free grammar. [2]
- f) Define Pushdown Automaton. [3]
- g) Define Chomsky Normal Form. [2]
- h) What is Restricted Turing Machines? [3]
- i) Define NP-complete problem. [2]
- j) Give examples for undecidable problems. [3]

PART – B**(50 Marks)**

2. Design a DFA which accepts set of all strings which are divisible by 5 for binary alphabet. [10]

OR

3. Illustrate an example to explain the process used to convert a non-deterministic automata to deterministic automata? [10]

4. Convert regular expression (01^*+1) to finite automata. [10]

OR

- 5.a) Prove that regular set $L = \{1^p/p \text{ is a prime}\}$ is not regular. [5+5]
- b) Explain about Pumping Lemma.

6. Construct a PDA that accepts the language $L = \{WCW^R \mid W \in (a+b)^*\}$ [10]

OR

- 7.a) Explain about Ambiguity in Grammars and Languages with example. [10]
- b) Discuss in detail about leftmost and right most derivation tree with example.

8. Design a Turing machine over $\Sigma = \{a, b\}$ to accept the language $L = \{WW^R \mid W \in (a, b)^+\}$. [10]

OR

9.a) Construct PDA from the following CFG

$S \rightarrow aAA$

$A \rightarrow aS \mid bS \mid a$

b) Explain Closure Properties of Context-Free Languages. [10]

10.a) Explain Decision Properties of Context-Free Languages.

b) Explain the concepts of Undecidable Problems about Turing Machines. [4+6]

OR

11.a) Discuss in detail about P and NP problems.

b) Explain about Post's Correspondence Problem with an example. [4+6]

---ooOoo---