

Code No: 5405AQ

R17

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech II Semester Examinations, June/July - 2019

THEORY OF COMPUTATION

(Computer Science)

Time: 3hrs

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, c as sub questions.

PART - A

5 × 5 Marks = 25

- 1.a) Give recursive definition for Regular Expression. [5]
- b) Write a CFG for EVEN palindromes. [5]
- c) Define Turing Machine. [5]
- d) What do you mean by Turing Reducibility? Explain briefly. [5]
- e) State the Cook-Levin Theorem. Discuss briefly. [5]

PART - B

5 × 10 Marks = 50

- 2.a) Design NFA to accept strings with 0's and 1's such that the string ends with 00.
- b) Design DFA to accept strings with c and d such that number of d's are divisible by 4. [5+5]

OR

3. Construct an NFA for the following:
 - a) $R=01[((10)^*+1(11)^*+0]^*1$
 - b) $((01+10)^*00)^*$ [5+5]

- 4.a) Write the Context Free Grammar for $L = \{a^n b^n \mid n \geq 1\}$.
- b) Design Push Down Automata for the language $L = \{ww^R \mid w \in (0+1)^*\}$. [5+5]

OR

- 5.a) Convert the following grammar to Chomsky Normal Form and simplify the grammar.
 $S \rightarrow ABA$
 $A \rightarrow aA \mid \epsilon$
 $B \rightarrow bB \mid \epsilon$
- b) Show that $L = \{a^n b^n c^n \mid n \geq 1\}$ is not CFL. [5+5]

6. Design Turing Machine $L = \{a^n b^n c^n \mid n \geq 1\}$. [10]

OR

7. Design Turing Machine which recognizes following language. [10]
 $L = \{0^n 1^n \mid n \geq 1\}$

8. What is decidability? Explain at least 4 decidable problems. [10]

OR

9. What do you mean by Halting Problem of Turing Machine? Discuss briefly. [10]

10. Explain the following problems and also state which type of problems they are?
a) Traveling Salesperson Problem.
b) Vertex Color Problem. [5+5]

OR

11. Explain about
a) NP Problem
b) P Problem [5+5]

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