

R16

Code No: 134BD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, April - 2018

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, c as sub questions.

PART- A

(25 Marks)

- 1.a) Define DFA. [2]
- b) Write about the applications of Finite Automata? [3]
- c) If a Regular grammar G is given by  $S \rightarrow aS/a$  Find DFA (M) accepting  $L(G)$ ? [2]
- d) Construct a regular grammar for  $L = \{0^n 11/n \geq 1\}$ . [3]
- e) For the Grammar  $\{S \rightarrow AS/a, A \rightarrow SbA/SS/ba\}$  construct Left most derivation for the string aabbaaa? [2]
- f) Define Push Down Automata. [3]
- g) What is the purpose of studying Turing Machine? [2]
- h) Write a Context free grammar for the language  $\{0^n 1^n/n \geq 1\}$ . [3]
- i) Give an example of un decidable problem. [2]
- j) Define Post correspondence Problem. [3]

PART-B

(50 Marks)

- 2.a) Construct Minimum state Automata for the following DFA?  
\* denotes final state

|                  |    |    |
|------------------|----|----|
| $\delta$         | 0  | 1  |
| $\rightarrow q1$ | q2 | q6 |
| q2               | q1 | q3 |
| *q3              | q2 | q4 |
| q4               | q4 | q2 |
| q5               | q4 | q5 |
| *q6              | q5 | q4 |

- b) Differentiate between NFA and DFA. [6+4]
- OR**
- 3.a) Design DFA for the following over  $\{a,b\}$ .
    - i) All strings containing not more than three a's.
    - ii) All strings that has at least two occurrences of b between any two occurrences of a.
  - b) Construct a DFA accepting the set of all strings ending with 00? [5+5]

- 4.a) Define Regular Expression? Explain about the Properties of Regular Expressions.  
b) Construct a DFA for the Regular Language consisting of any number of a's and b's. [5+5]

OR

- 5.a) Construct a DFA for the Regular expression  $(0+1)^*(00+11)(0+1)^*$ .  
b) Explain about the identity rules of Regular Expressions. [5+5]
- 6.a) Define Ambiguous Grammar. Check whether the grammar.  
 $S \rightarrow aAB, A \rightarrow bC/cd, C \rightarrow cd, B \rightarrow c/d$  Is Ambiguous or not?  
b) Construct a PDA for the following grammar  $S \rightarrow AA/a, A \rightarrow SA/b$ . [5+5]

OR

- 7.a) Show that for every PDA there exists a CFG such that  $L(G)=N(P)$ .  
b) Convert the grammar  $S \rightarrow 0AA, A \rightarrow 0S/1S/0$  to a PDA that Accepts the same Language by-Empty Stack. [5+5]
- 8.a) Construct a Turing Machine that will accept the Language consists of all palindromes of 0's and 1's?  
b) Explain about types of Turing Machine. [5+5]

OR

- 9.a) Obtain GNF for  $S \rightarrow AB, A \rightarrow BS/b, B \rightarrow SA/a$ .  
b) Design a Turing Machine for  $L = \{0^n 1^m 0^n / m, n \geq 1\}$ . [5+5]
- 10.a) Discuss in brief about NP Hard problems.  
b) Explain about the Decidability and Undecidability Problems. [5+5]

OR

- 11.a) Give an overview of recursively enumerable language.  
b) Give the correspondence between P, NP and NP-complete problems. [5+5]

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