

Code No: 134BD

R16
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 aabbbaaa? [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 an undecidable 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

δ	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 $L = \{0^n 1^m 0^n \mid m, n \geq 1\}$.

[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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