

Code No: 114AG

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, November/December - 2015

FORMAL LANGUAGES AND AUTOMATA THEORY

(Computer Science and Engineering)

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 Finite State Automata. | [2M] |
| b) Compare and Contrast between NFA and DFA. | [3M] |
| c) What is Derivation? Give an example. | [2M] |
| d) List out the applications of regular expressions. | [3M] |
| e) What are the components used to form a context free grammar. | [2M] |
| f) Write down the properties of push down automata. | [3M] |
| g) Draw notation for Turing machine. | [2M] |
| h) Discuss about recursively enumerable languages. | [3M] |
| i) Define P and NP problems. | [2M] |
| j) Discuss about Chomsky hierarchy of languages. | [3M] |

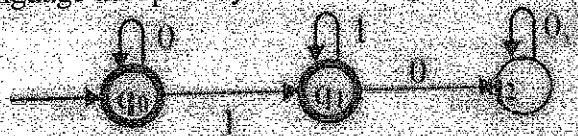
PART - B

(50 Marks)

2. Write DFA to accept strings of 0's, 1's and 2's beginning with a 0 followed by odd number of 1's and ending with a 2. [10]

OR

- 3.a) Obtain grammar to generate string consisting of any number of a's and b's with at least one b. [5+5]
- b) What is the language accepted by the following FA? [5+5]



- 4.a) What is regular grammar? How to convert left linear grammar into right linear grammars?
- b) Derive left and right most derivations for the input string $a=b^*c+d/e$ for the given grammar $E \rightarrow E+EE-E|E^*E$ $E \rightarrow E/E$ $E \rightarrow (E)id$ [5+5]

OR

- 5.a) Explain the algebraic laws of regular expressions.
- b) Explain the procedure for the conversion of DFA into regular expression like $(10)^*110(10)^*$ over an alphabet $\{0,1\}$. [5+5]

6. Minimize the grammar G given into equivalent grammar by removing useless symbols and productions from it. And also explain the reasons for minimization of grammar.
 $S \rightarrow Aa \quad A \rightarrow Sb|bcc|Da \quad A \quad C \rightarrow abb|DD \quad E \rightarrow ac \quad D \rightarrow aDA$ [10]

OR

- 7.a) Construct PDA to accept if-else of a C program and convert it to CFG.
(This does not accept if-else-else statements)
b) Design a PDA to accept the set of all strings of 0's and 1's such that no prefix has more 1's than 0's. [5+5]

- 8.a) Explain various types of Turing machines used for computable functions. [5+5]
b) Discuss about Unrestricted grammars.

OR

9. What is Context-sensitive language? How Linear Bounded Automata is related with it? Explain. [10]

10. Explain what an undecidable problem is and post correspondence problem? [10]

OR

11. Discuss in detail about Universal Turing machine. [10]