

Roll No. 862010.....

Total Pages : 3

BT-5/D-22

45170

FORMAL LANGUAGE AND AUTOMATA THEORY

Paper-PC-CS-303A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *five* questions in all, selecting *one* question from each unit. Question No. 1 is compulsory. All questions carry equal marks.

Compulsory Question

1. (a) What is Kleen closure and Positive closure?
- (b) Define ambiguity in Context free grammar.
- (c) Discuss in brief the steps in minimization of DFA.
- (d) What is Universal Turing Machine?

UNIT-I

2. (a) Define DFA and design a DFA for the following over $\{a, b\}$: All strings that has atleast two occurrences of b between any two occurrences of a .
- (b) Define Regular Expression? Explain about the Properties of Regular Expressions.
3. (a) Construct a DFA for the Regular expression $(0+1)^*(00+11)(0+1)^*$.

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- (b) Briefly discuss about Finite Automata with Epsilon - Transitions.

UNIT-II

4. (a) What is Pumping lemma? What are the applications of Pumping lemma? Discuss.
- (b) Convert the following grammar to GNF :
- $$S \rightarrow AB$$
- $$A \rightarrow aA|bB|b$$
- $$B \rightarrow b$$
5. (a) What is a regular language? Prove that the set of all strings of 0's and 1's whose length is a prime number is not a regular language.
- (b) Write a note on Chomsky Hierarchy of formal languages.

UNIT-III

6. Define PDA. Let G be the grammar given by : $S \rightarrow Aabb/Aaa, A \rightarrow Abb/A, B \rightarrow bBB/A$. Construct the PDA that accepts the language generated by this G.
7. (a) What is the difference between Moore and Mealy machines? Explain using suitable example.
- (b) Construct a PDA accepting the set of all strings over $\{a, b\}$ with equal number of a's and b's.

UNIT-IV

8. (a) What is Turing Machine? Construct a Turing Machine that will accept the Language consists of all palindromes of 0's and 1's.
- (b) What is Rice's theorem? Give a proof of Rice's theorem.
9. What do you Understand by undecidable problem? Discuss in detail the post correspondence problem.
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