

2014

Time : 3 hours

Full Marks: 70

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer from **all** the Groups are directed.

Group – A**(Compulsory)**

1. [A] Fill in the blanks of the following: 1x5=5
- I. Any equivalence relation R on a set S partitions S into disjoint equivalence _____.
 - II. Let S be a finite set. Then $f : S \rightarrow S$ is one to one iff it is _____.
 - III. Σ is a finite non-empty set of input called the _____.
 - IV. A typical transition system the initial state is represented by a _____.
 - V. Any set L accepted by a finite automata M is represented by a _____.
- [B] State 'True' or 'False' of the following: 1 x 10 = 10

- I. Two regular expressions P and Q are equivalent. If P and Q are same
- II. If X and Y are regular sets over Σ then $X \cup Y$ is also regular.
- III. A context-free grammar G is ambiguous if there exist some $w \in L(G)$, which is ambiguous.
- IV. A grammar is called a type 2 Grammar if it contains only type 2 production.
- V. A Moore machine is a six tuple $(Q, \Sigma, \Delta, \delta, \lambda, q^0)$ where Σ is the output alphabet.
- VI. If Σ is finite the Δ is finite.
- VII. A finite automaton can be represented by a tuple (Q, Σ, δ, F) .
- VIII. Pushdown automaton consists of a finite non-empty set of state denoted by Σ .
- IX. The number of vertices in a binary tree is odd.
- X. Number of vertices of odd degree in any graph is odd.

Group – B

Answer any **five** questions of the following: 5x5=25

2. What is tree? Prove that the number of leaves in a binary tree is $(n+1)/2$, where n is number of vertices.
3. Define Transition System.
4. Construct a Grammar which generates all even integers up to 998.
5. Explain the pumping Lemma for regular sets.
6. Explain the simplification of context-free grammar.
7. Define Non-deterministic finite state machine.

Group – C

Answer any **three** questions of the following:

10x3=30

8. What do you mean by Automation? Define finite Automation.
9. Define Parsing in the concept of Pushdown Automation.
10. Define the Pumping Lemma for context-free Languages.
11. What is graph? How to represent a graph? Prove that the number of vertices of odd degree in any graph is even.
12. What is Context-free Language and Derivation Trees.

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