MCA-302

December - Examination 2019

MCA III Year Examination

Formal Language and Automata

Paper - MCA-302

Time : 3 Hours] **[Max. Marks :- 80**

Note: The question paper is divided into three sections A, B and C. Write answers as per given instructions.

Section - A $8 \times 2 = 16$

(Very Short Answer Questions)

Note: Answer **all** questions. As per the nature of the question delimit your answer in one word, one sentence or maximum upto 30 words. Each question carries 2 marks.

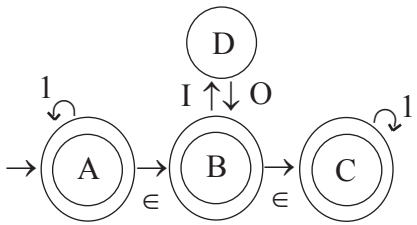
1. i. What is Set? Give an example.
   ii. Give one difference between CFG and CSG?
   iii. What is an instantaneous description (ID) of push down automaton (PDA)? Give an example.
   iv. Give the definition of GNF.
   v. Give the definition of Graph. Give an example.
   vi. What is the universal Turing Machine?
   vii. State Church's Thesis.
   viii. What do you mean by the Closure properties of Regular sets?

Section - B $4 \times 8 = 32$

(Short Answer Questions)

Note: Answer **any four** questions. Each answer should not exceed 200 words. Each question carries 8 marks.

2. Explain various types of relations with suitable examples.
3. Give the formal definition of finite automata. And explain the model of finite automata.
4. Construct the Finite automata for the regular expression (a*b + b*a)*a.
5. Discuss the applications of Pumping lemma.
6. Prove that Context Free language are closed under union, concatenation and reversal.
7. Write a short note on the Application of automata in NLSP.
8. Convert the following $\in$ - NFA to NFA and then convert the resultant NFA to DFA.



9. Write a short note on Polynomial-time reduction.

Section - C

$2 \times 16 = 32$

(Long Answer Questions)

Note: Answer **any two** questions. You have to delimit your each answer maximum upto 500 words. Each question carries 16 marks.

10. What is Grammer? Discuss Chomsky Classification of Languages in detail.

11. Explain the basic model of Turing Machine. Design a Turing Machine over {1} which can compute a function $f(n) = n^2$ over $\Sigma = \{1\}$.

12. When a Context-Free Grammar (CFG) is said to be ambiguous? Show that the following grammar is ambiguous: $S \rightarrow SbS \mid a$.

13. Define PDA. Construct a PDA equivalent to the language $L=\{wcw^R \mid w \in \{a,b\}^*\}$, where w^R is the reverse string of w.

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