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MCA-18

Formal Language and Automata
Master of Computer Applications
(MCA-11/16/17)

Fifth Semester

Examination, 2019

Time : **3** *Hours* *[Maximum Marks : 80*

Note : This paper is of Eighty (80) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

Section–A

Long Answer Types Questions

Note : Section 'A' contains Five (05) long-answer-type questions of Fifteen (15) marks each. Learners are required to answer any three (03) questions only. **(3×15=45)**

1. (a) What do you mean by the term Automata? How many types of Automata? Explain all its types with suitable example.

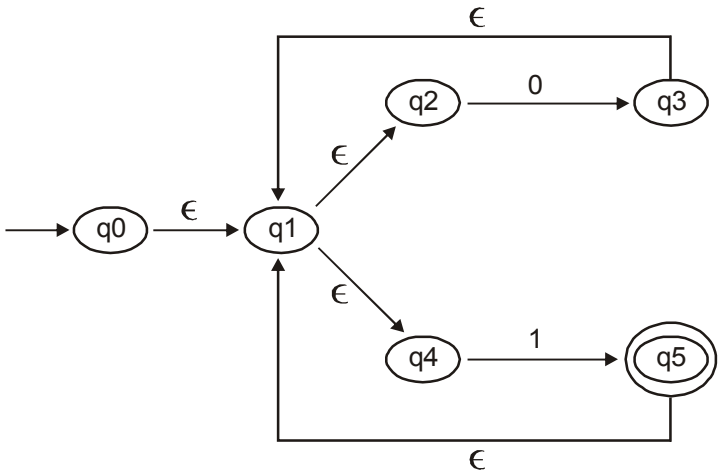
(b) Construct a finite automaton accepting all strings over {0, 1} :

(i) having odd number of 0

(ii) having even number of 0 and 1

2. (a) Explain the concept of pumping lemna for regular language. Prove that the language $L = (a^i\ b^i : i >= 1\}$ is not regular.

(b) Construct the DFA equivalent to the following NFA



3. (a) What do you mean by Chomsky classification of language? Explain with suitable example.

(b) Design a finite automaton for the language defined as :

(i) L = $\{x \mid x \in \{0, 1\}^*$ and x has even number of 0's and even number of 1's$\}$

(ii) L = $\{L = \{0^{2n} 1 \mid n >= 1\}\}$

4. (a) What is the additional feature PDA has when compared with NFA? Is PDA superior over NFA in the sense of language acceptance? Justify your answer.

   (b) Explain two stacks PDA. Construct a PDA for the language L = $\{0^n 1^n\}$ $n > 0\}$.

5. (a) What do you understand by CHURCH-TURING's thesis? Explain in brief.

   (b) Explain all the types of Turing machine.

Section–B

Short Answer Types Questions

Note : Section 'B' contains Eight (08) short-answer-type questions of Seven (07) marks each. Learners are required to answer any Five (05) questions only. **(5×7=35)**

1. Let G ({S, C}, {a, b}, P, S) where P consist of S→aCa, C→aCa, C→b. Find the language described by the grammar G.

2. What are the properties of regular expression and regular language?

3. Write short notes on Decidability, undecidability and halting problem.

4. Design a Turning machine that will accept a string 'xxyAyxx'.

5. State Post Correspondence Problem. Prove that Post Correspondence problem is undecidable.

6. What do you mean by PDA? Compare PDA with FA.

7. Give the regular expression for a language which does not contain any double letter over the alphabet $\Sigma = \{a, b\}$.

8. Write short notes on : Recursive Language and Recursively Enumerable Language.