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Roll No

MCADD-604
M.C.A. (Dual Degree/Integrated Course)
VI Semester

Examination, May 2018

Theory of Computation

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.
ii) All questions carry equal marks.

1. a) What is DFA? Write the difference between DFA and NFA.
b) Construct an NFA equivalent to the regular expression $10+(0+11)0^*1$.
2. a) Show that the language $L = \{a^n b^n | n \geq 1\}$ is unambiguous.
b) Obtain a derivation Tree for the string 0011000 using grammar
 $S \rightarrow AOS/O/SS, A \rightarrow S/1A/10$
3. a) Briefly explain how to convert regular expression into Automata.
b) Construct a Finite Automata that accept those string over $\{a, b\}$ that contain 'aaa' as substring.

4. Explain following term:

- a) Regular grammar
- b) Regular expression
- c) Regular set
- d) Closure property of regular grammar
- e) Two way finite automata

5. a) Prove that for every NDFA accepting a language L there exist an equivalent DFA concepting the same language L .

b) Convert the grammar $S \rightarrow aSb/bSa/a/b$ into GNF.

6. a) Explain the properties of recursive and recursively enumerable language in detail with an example.

b) Explain the Halting problem of Turing machine.

7. a) Explain context sensitive grammar with suitable example.

b) Explain Universal Turing Machine?

8. Design Turing machine to recognize the language

$\{0^n 1^n / n \geq 1\}$.
