

Roll No. to be filled in your Answer Book

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BCA (Third Semester) EXAMINATION, 20115

Theory of Computation

Time: 3.00 Hrs]

[Max. Marks: 70

All questions are compulsory and contain equal marks

- Let  $\Sigma = \{a, b\}$ . Write regular expression for the set of all strings in  $\Sigma^*$  with no more than three a's.
- State the mathematical definition of DFA. Define Context free grammar.
- Prove that, for every non- deterministic finite automation there is an equivalent deterministic finite automation. Explain Chomsky hierarchy
- Construct a DFA accepting all strings  $w$  over  $\{0, 1\}$  such that the number of 1's in  $w$  is  $3 \pmod 4$ .
- Construct a DFA accepting all strings over  $\{a, b\}$  ending in  $ab$ .
- Construct a PDA accepting all palindromes over  $\{a, b\}$ .

(1)

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- (g) Construct the Grammar  $S \rightarrow asb/A, A \rightarrow b Sa \mid \epsilon$  to pda that accepts the same language by empty stack.
- (h) Show that the class of Languages accepted by push down automata is exactly the class of context-free languages. What is halting problem? Explain.
- (i) Construct a Turing Machine that accepts the Languages  $a^*ba^*b$ .
- (j) Show that any finite set is Turing-decidable. What is the configuration of a Turing machine.
- (k) Explain pumping lemma for Regular languages with suitable example.

—x—