

Uttarakhand Technical University
BCA 3RD SEM, SESSION 2015-16

BCA-303
Time: 3 hours

THEORY OF COMPUTATION
Maximum Marks: 60

Note: Attempt all questions.

Q1. Attempt any three:-

(3X5=15)

(a) Let $S = \{a, b\}$. Write regular expression for the set of all strings in S^* with no more than three a's.

(b) State the mathematical definition of DFA. Define context free grammar.

(c) Construct a DFA accepting all string w over $\{0, 1\}$ such that the number of 1's in w is 3 mod 4.

(d) Construct a PDA accepting all palindromes over $\{a, b\}$.

Q2 Write a short note on any three of the following:-

(3X5=15)

- Arden's Theorem
- Halting Problem
- Church-Turing Thesis
- Turing Computable function.
- Greibach Normal Form

Q3. Attempt any two of the following :

(2X7.5=15)

(a) Prove that, for every non-deterministic finite automaton there is an equivalent deterministic finite automaton. Explain Chomsky hierarchy.

(b) Construct the grammar $S \rightarrow asd/A, A \rightarrow b Sa S$ to pda that accepts the same language by empty stack.

(c) Show that the class of languages accepted by push down automata is exactly the class of context-free languages. What is halting problem? Explain.

Q. 4. Attempt any two of the following :

(2X7.5=15)

(a) Explain pumping lemma for Regular languages with suitable example..

(b) Show that any finite set is Turing-decidable. What is the configuration of a Turing Machine?

(c) Design a C.F.G for the language:

(i) $L(G) = \{a^n b^{2n} / n \geq 0\}$

(ii) $L(G) = \{a^{2n} b^m / m, n \geq 0\}$