Paper Code : TOC:602

Paper Name : Theory of Computation

Teaching Hours (Per Week)		Examination Scheme		
TH. (hours)	Pr. (hours)	Internal	External	Total
		Th. (marks)	Th. (marks)	100 (marks)
4		30	70	

Lectures = 68 Hours

Objective:

In theoretical computer science and mathematics, the theory of computation is the branch that deals with whether and how efficiently problems can be solved on a model of computation, using an algorithm. A theoretical treatment of what can be computed and how fast it can be done. Applications to compilers, string searching, and control circuit design will be discussed. The hierarchy of finite state machines, pushdown machines, context free grammars and Turing machines will be analyzed, along with their variations.

UNIT I **(15 Hours)**

Introduction to alphabets, strings and languages, finite automata and finite state machines, DFA (deterministic finite automata),NFA(non -deterministic finite automata), NFA with € moves, equivalence among DFA, NFA and NFA with € moves.

UNIT II **(15 Hours)**

Regular expressions, union, concatenation and kleen closure operations on regular expressions, correspondence between finite automata and regular expressions, finite automata and regular expressions, finite automata with output like Moore and Mealy machines, pumping lemma for regular sets, Myhill-nerode theorem and minimization of finite automata.

UNIT III **(15 Hours)**

Context free grammar and languages , derivation trees, simplification of context free grammars, Chomsky normal form(CNF) , Greiabach normal form, ambiguity in grammars, push down automata, deterministic and non- deterministic push down automata, equivalence between push down automata and context free grammars.

UNIT IV **(15 Hours)**

Turing machines, church's hypothesis, ram machines, recursive and recursively enumerable languages, undecidability: properties of recursive and recursively enumerable languages, universal turing machine and an undecidable problem and rice's theorem.

UNIT V **(8 Hours)**

The Chomsky Heirarchy, Regular Grammars, Unrestricted Grammars, Context-sensitive languages, Relations between classes of languages.

Suggested text books and references:

1. Introduction to automata theory , language and computation by John E Hopcroft and Jeffrey D. Ullman, Narosa publishing house 1997.
2. Introduction to language and the theory of computation by john c. martin McGraw hill, international Editions 1991.
3. Michael Sipser, Introduction to Theory of Computation, 3/e, Course Technology, 2012
4. Peter Linz, "An Introduction to Formal Language and Automata", 4th Edition, Narosa Publishing house , 2006.
5. K.Krithivasan and R.Rama; Introduction to Formal Languages, Automata Theory and Computation; Pearson Education, 2009.
6. Computation : Finite and Infinite , By Marvin L. Minsky, Prentice-Hall
7. Introduction to formal languages,By G. E. Reevsz, Mc-graw hill.
8. Formal language theory , By M. H. Harrison