Course Curriculam

Course Code: CSE204

Course Level UG

Course Title Theory of Computation

Course Description :

Credit Units

L	T	P/S	SW	AS/DS	FW	No. of PSDA	Total Credit Unit
3	0	0	2	0	0	0	4

Course Objectives :

SN.	Objectives
1	The course begins with the basic mathematical preliminaries and goes on to discuss the general theory of automata, properties of regular sets and regular expressions, and the basics of formal languages. Besides, sufficient attention is devoted to such topics as pushdown automata and it's relation with context free languages, Turing machines and linear bounded automata, the basic concepts of computability such as primitive recursive functions and partial recursive functions.

Pre-Requisites : General

SN.	Course Code	Course Name

Course Contents / Syllabus :

SN.	Module	Descriptors / Topics	Weightage
1	Introduction to Languages and Automata	Formal Grammars and Chomsky Hierarchy, Regular Expression Deterministic and Nondeterministic Finite Automata	20.00
2	Regular Expressions	Regular Expression, Two way Finite Automata, Finite Automata with output, Properties of regular sets, pumping lemma for regular sets, My-Hill-Nerode Theorem	20.00
3	Context Free Grammars and Pushdown Automata	CFG: Formal Definition, Derivation and Syntax trees, Simplification Forms, Ambiguous Grammar, Properties of CFL, Normal Forms (CNF and GNF), Pushdown Automata: Definitions, Relationship between PDA and context free language, Decision Algorithms	20.00
4	Undecidability & Computability	Turing machine halting Problem, undecidable problems for recursive enumerable language, Post correspondence problems (PCP) and Modified Post correspondence problems, Undecidable problems for CFL. Partial and Total Functions, Primitive Recursive functions, Recursive functions.	20.00
5	Turing Machine	The Turing Machine Model, Language acceptability of Turing Machine, Design of TM, Variation of TM, Universal TM, Church's Machine. Recursive and recursively enumerable language, unrestricted grammars, Context Sensitive Language, Linear Bounded Automata (LBA).	20.00

Course Learning Outcomes :

SN.	Course Learning Outcomes
1	Familiarity with basics of Formal Languages, Grammars, Automata and their relationship
2	Design regular expressions and context-free grammars accepting or generating a certain language.
3	Transform between equivalent deterministic and non-deterministic finite automata, and regular expressions.
4	Design Push Down Automata, Equivalence of PDA to CFG and vice-versa.

5	Designing of Turing machines to solve problems
6	Classification of a Problem as decidable and undecidable.
7	Have an overview of how the theoretical study in this course is applicable to an engineering application like designing the compilers

Pedagogy for Course Delivery :

SN.	Pedagogy Methods
1	This is an introductory graduate level course to the theory of computation. We will briefly discuss in lectures finite and push-down automata, and regular and context-free languages and practice problems will be discussed in tutorials. We will then focus on the fundamental mathematical model of a Turing Machine, discuss its powers and limitations. The course will be delivered online with the help of e-contents using videos, online resources, quiz etc.

Theory /VAC / Architecture Assessment (L,T & Self Work): 100.00 Max : 100

Attendance+CE+EE : 5+35+60

SN.	Type	Component Name	Marks
1	Attendance		5.00
2	End Term Examination (OMR)		60.00
3	Internal	CLASS TEST	15.00
4	Internal	CLASS QUIZ	10.00
5	Internal	HOME ASSIGNMENT	4.00
6	Internal	Viva	3.00
7	Internal	GROUP PRESENTATION	3.00

Lab/ Practical/ Studio/Arch. Studio/ Field Work Assessment : 0.00 Max : 100

N/A

List of Professional skill development activities :

No.of PSDA : 3

SN.	PSDA Point
1	GROUP PRESENTATION
2	Quiz
3	case study

Text & References :

SN.	Type	Title/Name	Description	ISBN/ URL