

COURSE MODULE OF THE SUBJECT TAUGHT FOR THE SESSION 2024-2025

(ODDSEMESTER)

Course Syllabi with CO's

Academic Year: 2025–2026							
Department: Computer Science and Engineering							
Course Code	Course Title	Core/Elective	Prerequisite	Contact Hours			Total Hrs/Sessions
				L	T	P	
BCS503	Theory of Computation	Core	-	3	2	0	50
Objectives	<ul style="list-style-type: none"> ● Introduce core concepts in Automata and Theory of Computation. ● Identify different Formal Language Classes and their Relationships. ● Learn concepts of Grammars and Recognizers for different formal languages. ● Prove or disprove theorems in automata theory using their properties. ● Determine the decidability and intractability of Computational problems. 						
Topics Covered as Per Syllabus <p style="text-align: center;">Module 1:(10 Hours of Pedagogy)</p> <p>Introduction to Finite Automata, Structural Representations, Automata and Complexity. The Central Concepts of Automata Theory. Deterministic Finite Automata, Nondeterministic Finite Automata, An Application: Text Search, Finite Automata with Epsilon-Transitions.</p> <p>TEXT BOOK: Sections 1.1, 1.5, 2.2,2.3,2.4,2.5</p> <p style="text-align: center;">Module 2:(10 Hours of Pedagogy)</p> <p>Regular Expressions, Finite Automata and Regular Expressions, Proving Languages not to be Regular. Closure Properties of Regular Languages, Equivalence and Minimization of Automata, Applications of Regular Expressions</p> <p>TEXT BOOK: Sections 3.1, 3.2 (Except 3.2.1), 3.3, 4.1, 4.2, 4.4</p> <p style="text-align: center;">Module 3:(10 Hours of Pedagogy)</p> <p>Context-Free Grammars, Parse Trees, Ambiguity in Grammars and Languages, Ambiguity in Grammars and Languages, Definition of the Pushdown Automaton, The Languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata.</p> <p>TEXT BOOK: Sections 5.1, 5.2, 5.4, 6.1,6.2,6.3.1,6.4</p> <p style="text-align: center;">Module 4:(10 Hours of Pedagogy)</p> <p>Normal Forms for Context-Free Grammars, The Pumping Lemma for Context-Free Languages, Closure Properties of Context-Free Languages.</p> <p>TEXT BOOK: Sections 7.1, 7.2, 7.3</p>							

Module 5:(10 Hours of Pedagogy)

Introduction to Turing Machines: Problems That Computer Cannot Solve. The Turing Machine, Programming Techniques for Turing Machines, Extensions to the Basic Turing Machine, Undecidability: A Language That Is Not Recursively Enumerable.

TEXT BOOK: Sections 8.1,8.2, 8.3,8.4, 9.1, 9.2

List of Text Books

Textbooks:

1. John E Hopcroft, Rajeev Motwani, Jeffrey D. Ullman,” Introduction to Automata Theory, Languages and Computation”, Second Edition, Pearson.

ReferenceBooks:

1. Elain Rich, “Automata,Computability and complexity”, 1st Edition, Pearson Education,2018.
2. K.L.P Mishra, N Chandrashekar , 3rd Edition , “Theory of Computer Science”,PHI,2012.
3. Peter Linz, “An introduction to Formal Languages and Automata “, 3rd Edition, Narosa Publishers,1998.
4. Michael Sipser : Introduction to the Theory of Computation, 3rd edition, Cengage learning,2013.
5. John C Martin, Introduction to Languages and The Theory of Computation, 3rd Edition, Tata McGraw –Hill Publishing Company Limited, 2013.

CourseOutcomes

The student will be able to:

1. Apply the fundamentals of automata theory to write DFA, NFA, Epsilon-NFA and conversion between them.
2. Prove the properties of regular languages using regular expressions.
3. Design context-free grammars (CFGs) and pushdown automata (PDAs) for formal languages.
4. Design Turing machines to solve the computational problems.
5. Explain the concepts of decidability and undecidability.

TheCorrelationofCourseOutcomes(CO's)andProgramOutcomes(PO's)

Course Code: BCS503												
ListofCourseOutcomes	ProgramOutcomes											Total
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	
CO-1	3	3	3	2	-						2	13
CO-2	3	3	3	-	-						-	9
CO-3	3	3	3	2	-						2	13
CO-4	3	3	3	-	-						-	9
CO-5	3	3	3	2	-						2	13
Total	15	15	15	6	0	0	0	0	0	0	6	

Note: 3=Strong Contribution 2 =Average Contribution 1=Weak Contribution 0 =No Contribution

The Correlation of Course Outcomes (CO's) and Program Outcomes (PSO's)

SubjectCode:BCS503		Course Title: Theory of Computation	
List of Course Outcomes	Program Specific Outcomes		Total
	PSO-1	PSO-2	
CO-1	-	2	2
CO-2	-	1	1
CO-3	-	2	2
CO-4	-	2	2
CO-5	-	1	1
Total	-	8	8

Note: 3=Strong Contribution 2 =Average Contribution 1=Weak Contribution 0 =No Contribution

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