3	Computer Networks 6th Edition by Andrew S. Tanenbaum, Pearson Higher Ed Publication	2022
4	Communication Systems, Fourth Edition, Simon Haykin, — John Wiley & Sons.	2006

B.Tech. Information Technology				
Course code: Course Title	**Course Structure**			**Pre-Requisite**
Principles of Computing	**L**	**T**	**P**	Elementary set theory, Relations, Mappings, and linear algebra
	3	**1**	**0**	

Course Objective: To provide knowledge and skills in theoretical foundations of computing that are needed to study and practice computer science.

S. NO	**Course Outcomes (CO)**
CO1	Ability to understand the basic scientific principles of computing.
CO2	Ability to analyze, evaluate and conduct membership tests for grammars belonging to different formal languages.
CO3	Ability to design automata for a given language.

CO4	Ability to construct accepting and computing Turing Machines for a given language.
CO5	Ability to understand, analyze and evaluate complexity, reducibility, decidability, undecidability.

S. NO	Contents	Contact Hours
UNIT 1	Introduction to Computing: The scientific foundations of computing, Proof techniques and fundamentals, Concepts of soundness and completeness.	**8**
UNIT 2	Formal languages: Chomsky heirarchy of grammars, Regular grammars and languages, Context-free grammars and languages, Context-sensitive grammars and languages, Pumping lemma, Closure properties.	**8**
UNIT 3	Automata theory: Finite automata (NFA and DFA), Push-Down automata, Linear Bounded Automata, Equivalance of automata.	**8**
UNIT 4	Turing machines: Church Turing Thesis, Computing and accepting Turing Machines, Turing Machine Construction, Variants of Turing Machine, Recursive and recursively enumerable languages, Decidability and Undecidability, Universal Turing Machine, Halting problem.	**10**
UNIT 5	Computational complexity: Time complexity, Measuring complexity, P and NP classes, Co-NP and NP-Completeness, Problem reduction, Polynomial hierarchy and Hierarchy theorem, Space complexity and Savich's theorem, Log-space reducibility.	**8**
	TOTAL	**42**