M.Sc. (Information Technology)
Semester I

Course Code	PS01CINT21	Title of the Course	Introduction to Theoretical Computer Science
Total Credits of the Course	4	Hours per Week	4

Main Focus of the Course outcomes	Employability	Skill Development	Entrepreneurship
	✓		
Course Objectives:	1. To understand the basic concepts of theoretical computer science. 2. To understand the concepts of graphs, analysis of algorithms, time series and forecasting.		

Course Content		
Unit	Description	Weightage* (%)
1.	**Introduction** - Finite, Infinite and uncountable infinite sets - Ordered sets - The rules of sum and product - Relations and functions - Relational database model - Reflexive, symmetric and transitive relations, compatibility and equivalence relations - Partial ordering relations and lattices - Basic properties of lattices - Operations of join and meet in a lattice - Distributive lattices - Boolean algebras as lattices Canonical expressions - Applications to digital circuits and switching circuits	25

2.	**Graphs** - Basics of Graph - Application of graphs - Problem solving using graph theory. - Connected graphs, Sub-graphs, Euler graphs, Complete graph. - Multigraphs and weighted graphs - Paths and circuits - Shortest path in a weighted graph - Eulerian and Hamiltonian paths and circuits Planar graphs	25
3.	**Analysis of algorithms** - Introduction - Time complexity of algorithms - The shortest path algorithm - Complexity of problems - Tractable and intractable problems.	25
4.	**Time Series and Forecasting** - Introduction - Utility of Times Series analysis - Components of Time series - Cyclic variation and Irregular variation - Method of measurements of components, Merits and demerits - Forecasting models and methods.	25

Teaching-Learning Methodology	Blended learning approach incorporating traditional classroom teaching as well as online / ICT-based teaching practices

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%

3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	gain knowledge of theoretical computer science.
2.	gain knowledge of graphs, analysis of algorithms, time series and forecasting.

Suggested References:

Sr. No.	References
1.	C Lliu: Elements of Descrete Mathematics – TMH.
2.	J.E.Hopercroft and J D Ullman: Introductory Theory of Computer Science - Addison Wesley.
3.	Graph Theory with application to engineering and computer science. Narsingh Deo, PHI.
4.	S. C. Gupta – Fundamentals of Statistics, Himalaya Publishing House, Sixth Revised edition.
5.	Swapan Kumar chakraborty and Bikash Kanti Sarkar: Discrete Mathematics – OXFORD Higher Education.

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