

Shri G.S Institute Of Technology and Science

Department Of Applied Mathematics and Computational Science

Lecture Plan

Mathematical Theory Of Computation : MA 94205

Total No. Of Units : 5

Total No. Of Lectures : 40

Unit No.	No. of Lectures	Intended Topic Covered
I	3	Review of sets, Relations and Functions
	3	Review of Graphs and Trees
	1	Preposition and Predicate Calculus, Principal of Induction
	1	Languages and Grammers-Fundamental Concepts
II	1	Definition of Automata; Description of finite Automata
	2	Deterministic finite Accepters (DFAs), Non Deterministic finite Accepters (NFAs)
	4	Regular Grammars and Languages, Properties of Regular Languages, Lemma for Regular Languages. Pumping
III	2	Context free-grammars and Derivation Trees
	2	Parsing and ambiguity
	3	Normal form for Context free-grammars -Chomsky and Greibach normal form
	3	Pumping Lemma for Context Free languages ,Properties of Context Free languages.
IV	4	Basic Definition of Pushdown Automata, Pushdown Automata and Context Free languages.
	4	Non Deterministic Pushdown Automata and Deterministic Pushdown Automata,
		Pushdown Automata and Context Free languages.

V	3	Definition of a Turing Machine, Turing Machine as Language, Accepters, Turing's Thesis, Universal Turing Machine
	2	Linear Bounded Automata
	2	Computational complexity theory- P and NP Problems.

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Lecture Plan

MA 94206: Data Processing and Computation

Total No. Of Units: 5

Total No. Of Lectures: 40

Unit No.	No. of Lectures	Intended Topic Covered
I	2	Basics concepts, Data Models Categories, Schema, Instances & Database state
	1	Database Architecture
	1	Data Independence
	2	Database language, Role of Database Administrator
II	2	Entity relationships models
	3	Relational Data Models
	2	Relational algebra : Basic Relational algebra operations.
III	5	Structured Query languages(SQL) : Data Types, Basic Quires in SQL, insert, delete & update statements in SQL
	1	indexing in SQL
	1	Sequences in SQL
	1	VIEW in SQL
IV	1	Network data models
	1	Hierarchical data models
	6	Normalization theory
V	2	Transaction Management : Basic concepts of Transactions
	2	Schedule and their types

	3	Concurrency Control
	3	Database Recovery Concepts and techniques

Shri G. S. Institute of Technology and Science
 Department of Applied Mathematics and Computational Science
 M.Sc. Applied Mathematics, Semester II
 MA 94207: OPERATIONS RESEARCH

Total No. of Units: 5

Total No. of Lectures: 40

LECTURE PLAN

S.No.	TOPICS	No. of Lectures
UNIT – I		
1.	Introduction to linear algebra as pre-requisite, linear programming problem: formulation and components. Definitions of decision variables, slack and surplus variables. Mathematical formulation of LPP.	02
2.	Solution of LPP: Initial basic feasible solution, graphical method of solution.	01
3.	Solution of LPP using Simplex method and Big-M method	04
4.	Duality in linear programming, Dual simplex method, degeneracy.	02
UNIT – II		
5.	Assignment problem, its solution, special cases, unbalanced problem, maximization problem	03
6.	Transportation problem: solution through various methods, unbalanced transportation problem	03
7.	Game theory: two-person zero-sum game, pure and mixed strategies, Min-max and max-min principles, solution of the game by algebraic method and dominance rule	03
UNIT – III		
8.	Sequencing and scheduling: Sequencing problem with n jobs and 2 machines, n jobs, and 2 machines and in general n jobs and m machines using SM Jhonson's rule. Calculation of elapsed and idle times.	03
9.	Objectives of CPM & PERT, elements of the network, network rules, constraints, error in the network, Critical Path Analysis, Activity time and floats, optimization through CPM techniques,	03
10.	PERT and three estimates, critical path analysis of a PERT network, probability of completion of the project, controlling and monitoring.	02
UNIT – IV		
11.	Simple and mathematical definition of Information, basic ideas of information, communication system, Noisy and noiseless channel, Channel matrix	02
12.	Measure of uncertainty and properties of entropy function, Channel capacity, efficiency and redundancy encoding	02
13.	Shannon Fano encoding procedure	02

UNIT – V		
14.	Dynamic Programming: definition, formation, approaches, Bellman's inequality principle, characteristics of dynamic programming, shortest path/stage coach problems.	04
15.	Non-linear programming problems: formulation, Lagrangian method, Kuhn-Tucker conditions and Quadratic programming	04

Shri G. S. Institute of Technology and Science
Department of Applied Mathematics and Computational Science
M.SC-II Semester
MA94208: Real and Complex Analysis.

Total no. of Units: 5

Total No. of Lectures:40

LECTURE PLAN

<u>S.No.</u>	<u>Topic</u>	<u>No. of Lecture No.</u>
	UNIT-1	
1	Measure theory,function of bounded variation, Measurable and non-measurable sets	2
2	Borel sets, measurable function,Lebesgue integral for bounded function over a set of finite measure	3
3	Lebesgue integral unbounded function,theorem on convergence in measure, Lebesgue class L_p .	3
	UNIT-II	
4	Fourier series, Convergent criteria, Convergent problem.	3
5	Dirichlet's condition, Riemann-Lebesgue theorems and its consequences	3
6	Fourier analysis	2
	UNIT-III	
7	Concept of analytic function, C-R equation, Conjugate function, Harmonic Function	2
8	Poisson's formula, Schwarz's theorem & reflection principle, Conformality	2
9	Area & closed curves analytic function in region, conformal mapping,length & area	2
10	Linear transformation, the linear groups,cross-ratio symmetry & oriented circles, use of level surface.	2
	UNIT-IV	
11	Complex integration, Line integral Rectifiable arces	3
12	Cauchy's theorem for rectangle,Cauchy's theorem for circular disk	3
13	The index of a point with respect to a closed curve, Cauchy's integral formula.	2
	UNIT-V	

14	The general form of Cauchy's theorem & calculus of residue, chain and cycle, simple connectivity.	3
15	Exact differentials in simplyconnectedregions,Residue theorem	3
16	The argument principle ,Banach points	2

