DEPARTMENT OF COMPUTER SCIENCE

Gopinath Bordoloi Nagar, Gauhati University

Guwahati-781014, Assam, India

LESSON PLAN

Subject Name : **Mathematical Foundation of Computer Science**

Paper Code : **CSC1056/INF1046** **Session: 2022-2023**

Program Name : **M.Sc. (CS/IT)** **Semester: First**

Faculty Name : **Pranamika Kakati**

Date : **01/08/2022 to 12/12/2022**

Detailed Lesson Plan

UNIT-I (Discrete mathematical structures)

Lecture No	Topics to be Covered
1	Congruence
2	Permutation and combination withrepetitions
3	Basic concepts of sets. The principle of inclusionand exclusion.
4	Fuzzy sets
5	Relations, binary relations, closure of relations
6	Functions
7	Posets and Lattices.
8	Boolean Algebra; Boolean functions (SOM and POM)
9	Algebraic structures- Groups, Free groups
10	Permutation groups
11	Homomorphism and Isomorphism
12	Vector Spaces and its properties
13	basis and dimension
14	Linear transformations and linear operators
15	Fuzzy set operations

16	Defuzzification Methods

UNIT-II (Mathematical Logic)

17	Connectives- statement formulae and truth tables
18	tautologies and tautological implications
19	two-state devices and statement logic
20	Theory of inference- rules
21	consistency of premises and indirect method of proof
22	automatic theorem proving
23	Propositional calculus
24	Predicate calculus- predicates, quantifiers, predicate formulas
25	free and bound variables
26	inference theory of predicate calculus
27	validity, soundness, completeness, compactness (definitions only)
28	Resolution principles
29	Skolemization and Herbrand domain
30	Introduction to axiomatic theory

UNIT-III (Graph theory)

31	Basic concepts- finite and infinite graphs
32	incidence and degree
33	isolated and pendant vertices, null graph.
34	Paths and Circuits- isomorphism
35	subgraphs, walks
36	connected and disconnected graphs and components
37	Euler graphs
38	Bi-partite graphs
39	Hamiltonian paths and circuits
40	Trees- properties of trees

41	distance and centers
42	rooted and binary trees
43	counting trees
44	spanning trees
45	fundamental circuits
46	spanning trees in weighted graphs
47	Cut-sets- properties
48	connectivity and separability
49	Network flows
50	Matrix representation of graphs
51	incidence matrix, submatrices
52	circuit matrix, cut-set matrix
53	path matrix, adjacency matrix
54	Coloring, Covering and Partitioning- basic concepts
55	Directed graphs- definition, types
56	directed paths and connectedness
57	Euler digraph
58	tress with directed edges.

UNIT-IV (Automata theory)

59	Concept of language and grammar
60	Review of DFA, NFA, NFA with empty moves and their equivalence. Minimization of FA
61	Regular sets and regular expressions
62	Pumping lemma for regular sets
63	closure properties and decision algorithms for regular sets
64	Context free language - definition
65	removal of useless symbols, removal of null productions and unit productions
66	Normal forms of CFLs- CNF and GNF

With regards,

Yours faithfully,

(**Pranamika Kakati**)
(Assistant Professor(contractual), Dept. of Computer Sc., GU)