DPG Institute of Technology and Management
Sector 34, Gurugram HR 122004

Lesson Plan

Course Name: B.TECH (CSE&DATA SCIENCE)

Faculty Name: Archana Rohilla (Assistant Professor)

No. of Lecture Hours/Week		**Exam Hours**	**3**
Total No. of Lecture Hours		**Exam Marks**	**75**
Course Code:	**PCC-CSE-307G**	**SEMESTER**	**5th**

Course Objectives:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.

Lecture No.	Topics to be covered	Teaching Methodology	Class Activity/ Event	Remark /CO
SECTION A	**Introduction to Algorithms:**			CO1
1	Algorithm	PPT		
2	Performance Analysis (Time and Space complexity)	Chalk &Talk		
3	Asymptotic Notation (Big OH, Omega and Theta)	Chalk &Talk		
4	Best, average and worst-case behavior	Chalk &Talk		
5	Elementary Data Structures (Basic terminology of Stacks and Queues, Tree, Graph)	SMART BOARD	Assignment-1	
6	Stacks	Chalk &Talk		
7	Queues			
8	Tree	Chalk &Talk		
9	Graph	Chalk &Talk		
10	Sets and Disjoint Set Union.	SMART BOARD		
11	**Divide and Conquer:** General method,	Chalk &Talk		
12	Binary Search			
13	Merge Sort	Chalk &Talk		
14	Quick Sort	Chalk &Talk		
15	Strassen's Matrix Multiplication algorithms and analysis	Chalk &Talk		
SECTION B	**Greedy Method:**	Chalk &Talk		CO2
16	General method			

17	Fractional Knapsack problem	Chalk &Talk		
18	Job Sequencing with Deadlines	Chalk &Talk		
19	Minimum Cost Spanning Trees	Chalk &Talk		
20	Single source shortest paths	PPT		
21	**Dynamic Programming:** General method	PPT		
22	Optimal Binary Search Trees			
23	0/1 knapsack			
24	The Traveling Salesperson problem	PPT		
SECTION C	**Back Tracking:**	Chalk &Talk		CO3
25	General method	Chalk &Talk		
26	The 8-Queen's problem	Chalk &Talk		
27	Sum of subsets	SMART BOARD		
28	Graph Colouring	Chalk &Talk		
29	Hamiltonian Cycles			
30	Branch and Bound: The method	Chalk &Talk		
31	0/1 knapsack problem	Chalk &Talk		
32	Traveling Salesperson problem	SMART BOARD		
33	Efficiency considerations	Chalk &Talk		
SECTION D	**NP Hard and NP Complete Problems:**			CO4
34	Basic concepts: NP Hard	Chalk &Talk		
35	Basic concepts: NP Complete	Chalk &Talk		
36	Cook's theorem	Chalk &Talk		
37	NP hard graph problems	Chalk &Talk		
38	NP hard scheduling problems			
39	NP hard code generation problems	Chalk &Talk		
40	Some simplified NP hard problems	Chalk &Talk	Assigment-2	
41	REVISION	Chalk &Talk		
42	REVISION	PPT		

Suggested Text / Reference Books

1. The Design and Analysis of Computer Algorithm, Aho A.V. Hopcroft J.E., 1974, Addison Wesley.
2. Algorithms-The Construction, Proof and Analysis of Programs, Berlion, P.Bizard, P., 1986. Johan Wiley & Sons,
3. Writing Efficient Programs, Bentley, J.L., PHI
4. Introduction to Design and Analysis of Algorithm, Goodman, S.E. &Hedetnieni, 1997, MGH.
5. Introduction to Computers Science- An algorithms approach, Jean Paul Trembley, Richard B.Bunt, 2002, T.M.H.
6. Fundamentals of Algorithms: The Art of Computer Programming Vol Knuth, D.E.: 1985, Naresh Publication.

Course Outcomes:

At the end of the course, the student will be able:

CO 1	To identify and justify correctness of algorithms and to analyse running time of algorithms based on asymptotic analysis.
CO 2	To understand when an algorithmic design situation calls for the divide-and-conquer paradigm. Synthesize divide-and-conquer algorithms.
CO 3	Describe the greedy paradigm and dynamic-programming paradigm. Explain when an algorithmic design situation calls for it
CO 4	Developing greedy algorithms/dynamic programming algorithms, and analyze it to determine its computational complexity.
CO 5	To write the algorithm using Backtracking and Branch and Bound strategy to solve the problems for any given model engineering problem.