DSC-4C	BCS-C401	DESIGN AND ANALYSIS OF ALGORITHMS	L	C	CIA	ESE	Time for ESE
			4	4	30	70	3Hrs.

PREREQUISITES	:	Knowledge of C/C++ programming, Data Structure, Discrete Mathematical Structures
COURSE OBJECTIVES/ LEARNING OUTCOMES	:	Upon successful completion of this course, the student will be able to: • Analyze and compare complexity for different types of algorithms for different types of problems. • Apply mathematical preliminaries to the analyses and design stages of different types of algorithms • Recognize the general principles and good algorithm design techniques for developing efficient computer algorithms.

NOTE: The question paper shall consist of three sections (Sec.-A, Sec.-B and Sec.-C). **Sec.-A** shall contain 10 objective type questions of one mark each and student shall be required to attempt all questions. **Sec.-B** shall contain 10 short answer type questions of four marks each and student shall be required to attempt any five questions. **Sec.-C** shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Introduction: RAM model, O(log n) bit model. **3L**

Review of data structures: Balanced trees, Mergeable sets. **3L**

Algorithm Design Techniques: Iterative techniques, Divide and conquer, dynamic programming, greedy algorithms. **14L**

Searching and Sorting Techniques: Review of elementary sorting techniques-selection sort, bubble sort, insertion sort, more sorting techniques-quick sort, heap sort, merge sort, shell sort, external sorting. **8L**

Lower bounding techniques: Decision Trees, Adversaries. String Processing: KMP, Boyre-Moore, Robin Karp algorithms. **8L**

Introduction to randomized algorithms: Random numbers, randomized Qsort, randomly Built BST Number Theoretic Algorithms: GCD, Addition and Multiplication of two large numbers, polynomial arithmetic, Fast-Fourier Transforms. **10L**

Graphs: Analysis of Graph algorithms Depth-First Search and its applications, Breadth-First Search and its applications, minimum Spanning Trees and Shortest Paths. **8L**

Introduction to Complexity Theory: Class P, NP, NP-Hard, NP Completeness. Introduction to Approximation Algorithms **6L**

BOOKS RECOMMENDED :

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, Introduction to Algorithms, Prentice-Hall of India, 2006.
2. J. Kleinberg and E. Tardos, Algorithms Design, Pearson Education, 2006.
3. S. Baase, Computer Algorithms: Introduction to Design and Analysis, Addison Wesley, 1999.
4. A.V. Levitin, Introduction to the Design and Analysis of Algorithms, Pearson Education, 2006.