DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY

Course Data Sheet

Name of the Program:B.Tech in Computer Science and Engineering		Academic Year :2023-24
Year & Semester : III Year I Semester	Section :B	No. of Credits:03
Name of the Course : DESIGN AND ANALYSIS OF ALGORITHMS		Code :R20C302
Course : Core		Regulation : R20
Course Area/Module : Core Engineering	No. of Students Registered :66	
Name of the Faculty :Mr.M.Sriramulu		Designation :Asst. Prof

Preface of the course:

This course introduces formal techniques to support the design and analysis of algorithms, focusing on both the underlying mathematical theory and practical considerations of efficiency.The course emphasizes the relationship between algorithms and programming, and introduces basic performance measures and analysis techniques for these problems.

Course Syllabus Unit Wise:

UNIT I:

Introduction: Algorithm Definition, Algorithm Specification, performance Analysis, Performance measurement, asymptotic notation, Randomized Algorithms.

UNIT II:

Divide and Conquer: General Method, Defective chessboard, Binary Search, finding the maximum and minimum, Merge sort, Quick sort.

The Greedy Method: The general Method, knapsack problem, minimum-cost spanning Trees, Optimal Merge Patterns, Single Source Shortest Paths.

UNIT III:

Dynamic Programming: The general method, multistage graphs, All pairs-shortest paths, optimal Binary search trees, 0/1 knapsack, The traveling salesperson problem.

UNIT IV:

Backtracking: The General Method, The 8-Queens problem, sum of subsets, Graph coloring, Hamiltonian cycles, knapsack problem.

UNIT V:

NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP - Hard and NP-Complete classes, Cook's theorem.

Text Books:

1. Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition, Universities Press.
2. Introduction to Algorithms Thomas H. Cormen, PHI Learning
3. Harsh Bhasin, "Algorithms Design & Analysis", Oxford University Press.

Reference Books:

1. Horowitz E. Sahani S: "Fundamentals of Computer Algorithms", 2nd Edition, Galgotia Publications, 2008.
2. S. Sridhar, "Design and Analysis of Algorithms", Oxford University Press.

COURSE OBJECTIVES

At the end of the Course/Subject, the students will:

S.No	Course Objectives (Cobs)	COs*
1	Ability to understand, analyze and denote time complexities of algorithms •	R20C302.1
2	To introduce the different algorithmic approaches for problem solving through numerous example problems •	R20C302.2 R20C302.3 R20C302.4
3	Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.	R20C302.3
4	To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP-completeness •	R20C302.5

COURSE OUTCOMES
At the end of the Course/Subject, the students will be able to:

S.No	Course Outcome	PO	PSO	Blooms taxonomy Level
R20C302.1	Make use of algorithm analysis, including time and space complexities, and effectively solve algorithm performance problems.	1	1,2	Applying (L2)
R20C302.2	Contrast divide and conquer and greedy techniques to effectively solve various problems and analyze their performance.	2	1,2	Analyzing(L3)
R20C302.3	Analyze Dynamic Programming technique to effectively solve various problems and analyze their performance.	2	1,2	Analyzing(L3)
R20C302.4	Simplify various problems using Backtracking techniques and analyze their performance.	2	1,2	Analyzing(L3)
R20C302.5	Examine NP-Hard and NP-Complete Problems	2	1,2	Analyzing(L3)

Course Outcome vs POs Mapping:

Course Out Come	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

R20C302.1	3(1.6.1)	-	-	-	-	-	-	-	-	-	-	-
R20C302.2	3(1.6.1)	3(2.5.2)	-	-	-	-	-	-	-	-	-	-
R20C302.3	3(1.6.1)	3(2.5.2)	-	-	-	-	-	-	-	-	-	-
R20C302.4	3(1.6.1)	3(2.5.2)	-	-	-	-	-	-	-	-	-	-
R20C302.5	3(1.6.1)	3(2.5.2)	-	-	-	-	-	-	-	-	-	-
Total	15	12	-	-	-	-	-	-	-	-	-	-
Average	3	3	-	-	-	-	-	-	-	-	-	-

Justification of Mapping of Course Outcomes with Program Outcomes:

1. R20C302.1, R20C302.2, R20C302.3R20C302.4, and R20C302.5 is strongly mapped with PO1 (Engineering Knowledge) is aligned with these outcomes since they inherently require a mastery of mathematical and scientific principles, directly showcasing the students' application of their knowledge in algorithm analysis, problem-solving, and computational complexity analysis, thus fulfilling the objectives of PO1.

2. R20C302.1, R20C302.2, R20C302.3R20C302.4, and R20C302.5 is strongly mapped with PO2 (Problem Analysis) that is students with the essential skills to analyze problems, identify suitable algorithmic techniques, and assess the performance of their solutions.

Course Outcome vs PSOs Mapping:

Course Out Come	PSO1	PSO2
R20C302.1	3	3
R20C302.2	3	3
R20C302.3	3	3
R20C302.4	3	3
R20C302.5	3	3
Total	15	15
Average	3	3

Justification of Mapping of Course Outcomes with Program Specific Outcomes:

1. R20C302.1, R20C302.2, R20C302.3R20C302.4, and R20C302.5 is strongly mapped with PSO1 fulfilled as students acquire a solid foundation in algorithm analysis, problem-solving techniques, and computational complexity, which are essential for developing proficiency in algorithms, enabling individuals to efficiently tackle complex problems, make informed algorithmic choices, and design optimal solutions.

2. R20C302.1, R20C302.2, R20C302.3R20C302.4, and R20C302 is strongly mapped with PSO2 fulfilled as the comprehensive understanding of algorithm analysis, proficiency in various problem-solving techniques, and knowledge of advanced concepts like NP-Hard and NP-Complete problems significantly enhance individuals'

competitiveness in competitive examinations, thus opening doors for successful higher studies and employment opportunities.

Mention Gaps Identified (Missing Content of syllabus / Industry/Profession Requirements) if any:

S No	Gap identified	Relevant to	Proposed action

Mention Gaps Identified (POs) if any :

S No	Gap identified	Relevant to	Proposed action
NIL			

Topics Beyond Syllabus/Advanced Topics/Design:

NIL

Delivery/Instructional Methodologies:

1. Lecture by use boards / LCD projectors.
2. Questioning & Discussion
3. Simulation

Handouts:

1. Printed materials (unit wise) are supplied

Assessment Methodologies-Direct

- Assignments
- Tests/Model exams
- Univ. Examination

Course Outcome Learning Assessment Methodologies-Indirect

- Assessment of Course Outcomes (By Feedback, Once)
- Student Feedback on Faculty (Twice)

Innovative Teaching/Learning/Evaluation Processes:

- Different teaching aids like Power point presentations, audio & visual presentations are adopted
- Adaptive teaching is followed to focus on the whole class
- Tutorial classes are conducted to improve problem solving skills and motivate slow learners
- Conducting remedial classes for slow learners to improve their academic performance

  Standard cognitive tests are conducted regularly on completion of each unit

Course Attainment Target:

EXTERNAL			
EXTERNAL Target % & Attainment Levels			
Set Target %	**4 5**	**Attainment Levels**	
Attainment Level 1		50% or less number of students scoring more than 45% marks in External examination	1
Attainment Level 2		51% to 69% of students scoring more than 45% marks in External examination	2
Attainment Level 3		70% & above number of students scoring more than 45% marks in External examination	3

TOTAL EXTERNAL ATTAINMENT	**% of students got greater than 45% marks in External Assessment**	

Signature of Course Coordinator

Date:

Signature of HOD

Date: