COURSE MODULE: DESIGN AND ANALYSIS OF ALGORITHM

Course Coordinator: Prof. Yeshashwini Bhandari K R				Academic Year:**2025-26**	
Department: Bachelor of Computer Applications					
Course Code	**Course Title**	**Core/Elective**	**Prerequisite**	**Contact Hours** L: T: P:S	**Total Hrs/ Sessions**
BBCA402	**Design and Analysis of Algorithm**	**PCC**	Basic knowledge on problem-solving, Data Structures.	3:0:0	40

Course Learning Objective:

The course will enable the students to:

- To introduce students to the fundamental concepts of algorithms and their performance analysis.
- To teach students how to solve problems using the Divide and Conquer strategy.
- To develop students' ability to apply the Greedy Method for optimization problems.
- To enable students to use Dynamic Programming techniques for problem-solving.
- To teach basic traversal techniques and problem-solving using Backtracking.

Module-1

INTRODUCTION: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation, Big oh notation, Omega notation, Theta notation.

Module-2

DIVIDE AND CONQUER: General method, applications-Binary search, Quick sort, Strassen‟s Matrix multiplication, Finding Max Min, Selection sort

Module-3

GREEDY METHOD: General method, applications-Job sequencing with deadlines, Knapsack problem, Single source shortest path, Minimum cost spanning trees, Optimal storage on tapes.

Module-4

DYNAMIC PROGRAMMING: General method, applications- Multistage graph, All pairs shortest path problem, Travelling sales person problem.

Module-5

Basic Traversal and Search Techniques: Binary search tree, techniques for binary trees, techniques for graphs, connected components and spanning trees.

BACKTRACKING: General method, applications- N-queen problem, sum of subsets problem, Hamiltonian cycles.

Course Outcomes:

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

- **CO 1.** Understand and analyze the performance of algorithms using asymptotic notations.
- **CO 2.** Apply the divide and conquer method to solve computational problems efficiently.
- **CO 3.** Design and apply greedy algorithms for optimization problems.
- **CO 4.** Develop dynamic programming solutions for complex multi-stage problems.
- **CO 5.** Implement traversal techniques and solve constraint satisfaction problems using backtracking.

Teaching Methodology: Chalk and talk method / PowerPoint Presentation.

Assessment Details (both CIE and SEE) of Course:

To satisfy academic requirements and earn credits for each subject/course, students must meet the following criteria:

- Secure at least 40% (20/50 marks) in Continuous Internal Evaluation (CIE)
- Obtain a minimum of 35% (18/50 marks) in the Semester End Exam (SEE)

Achieve a combined total of at least 40% (40/100 marks) in both CIE and SEE

Continuous Internal Evaluation (CIE)

Components:

- **Unit Tests (Internal Assessment Tests): 2 tests, each 25 marks (1 hour duration)**
  - Test 1: After completing 40-50% of the syllabus
  - Test 2: After completing 85-95% of the syllabus
- **Assignments: 2 assignments, each 25 marks (1 hour duration)**
  - Any two methods

CIE Marks Calculation:

- Sum of marks from two tests and two assignments = 100 marks
- Scaled down to 50 marks

CIE Design:

- Each CIE method should cover a different portion of the syllabus to minimize stress and repetition
- CIE methods/question papers are designed to assess different levels of Bloom's taxonomy as per the course outcomes

Semester End Examination (SEE)

Theory SEE:

- Conducted by the University as per the scheduled timetable
- Common question papers for the subject (duration: 3 hours)

Question Paper Structure:

- 10 questions, each worth 20 marks
- 2 questions from each module, with a mix of topics under each module (max. 3 sub questions per question)

Answering Scheme:

- Students must answer 5 full questions, selecting one from each module

Marking Scheme:

- Marks scored will be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. Ellis Horowitz, SatrajSahni and Rajasekharan, Fundamentals of Computer Algorithms,2nd Edition, University Press,2008
2. M. T. Goodrich and R. Tomassia, Algorithm Design Foundations, Analysis and Internet examples, 1st Edition,John wiley and Sons,2006.

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=gY0MwGLq9W8&list=PLyqSpQzTE6M9DKhN7z2fOpKTJWu639_P

The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

SUBJECT CODE: BBCA402	TITLE: Design and Analysis of Algorithm	FACULTY: YESHASHWINI BHANDARI K R

List of Course Outcomes	Program Outcomes							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO-1								
CO-2								
CO-3								
CO-4								
CO-5								
Total								

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution - = No Contribution