# FUTURE VISION BIE

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## & Lab Programs

Future Vision

## By K B Hemanth Raj

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**ADVANCED ALGORITHMS**
**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the academic year 2017-2018)**
**SEMESTER – V**

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|---|---|---|---|
| Subject Code | 17CS554 | IA Marks | 40 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 60 |
| Total Number of Lecture Hours | 40 | Exam Hours | 03 |

**CREDITS – 03**

| **Module – 1** | **Teaching Hours** |
|---|---|
| **Analysis Techniques**: Growth functions, Recurrences and solution of recurrence equations; Amortized analysis: Aggregate, Accounting, and Potential methods, String Matching Algorithms: Naive Algorithm; Robin-Karp Algorithm, String matching with Finite Automata, Knuth-Morris-Pratt and Boyer-Moore Algorithms | **8 Hours** |
| **Module – 2** | |
| Number Theoretic Algorithms: Elementary notions, GCD, Modular arithmetic, Solving modular linear equations, The Chinese remainder theorem, Powers of an element RSA Cryptosystem, Primality testing, Integer factorization, - Huffman Codes, Polynomials. FFT-Huffman codes: Concepts, construction, Proof correctness of Huffman's algorithm; Representation of polynomials | **8 Hours** |
| **Module – 3** | |
| DFT and FFT efficient implementation of FFT, Graph Algorithms, Bellman-Ford Algorithm Shortest paths in a DAG, Johnson's Algorithm for sparse graphs, Flow networks and the Ford-Fulkerson Algorithm, Maximum bipartite matching. | **8 Hours** |
| **Module – 4** | |
| Computational Geometry-I: Geometric data structures using, C, Vectors, Points, Polygons, Edges Geometric objects in space; Finding the intersection of a line and a triangle, Finding star-shaped polygons using incremental insertion. | **8 Hours** |
| **Module – 5** | |
| Computational Geometry-II: Clipping: Cyrus-Beck and Sutherland-Hodman Algorithms; Triangulating, monotonic polygons; Convex hulls, Gift wrapping and Graham Scan; Removing hidden surfaces | **8 Hours** |

**Course outcomes:** The students should be able to:

- Explain the principles of algorithms analysis approaches
- Apply different theoretic based strategies to solve problems
- Illustrate the complex signals and data flow in networks with usage of tools
- Describe the computational geometry criteria.

**Question paper pattern:**
The question paper will have TEN questions.
There will be TWO questions from each module.
Each question will have questions covering all the topics under a module.
The students will have to answer FIVE full questions, selecting ONE full question from each module.

**Text Books:**


1. Thomas H. Cormen et al: Introduction to Algorithms, Prentice Hall India, 1990
2. Michael J. Laszlo: Computational Geometry and Computer Graphics in C' Prentice

Hall India, 1996

**Reference Books:**


1. E. Horowitz, S. Sahni and S. Rajasekaran, Fundamentals of Computer Algorithms, University Press, Second edition, 2007
2. Kenneth A Berman & Jerome L Paul, Algorithms, Cengage Learning, First Indian reprint, 2008