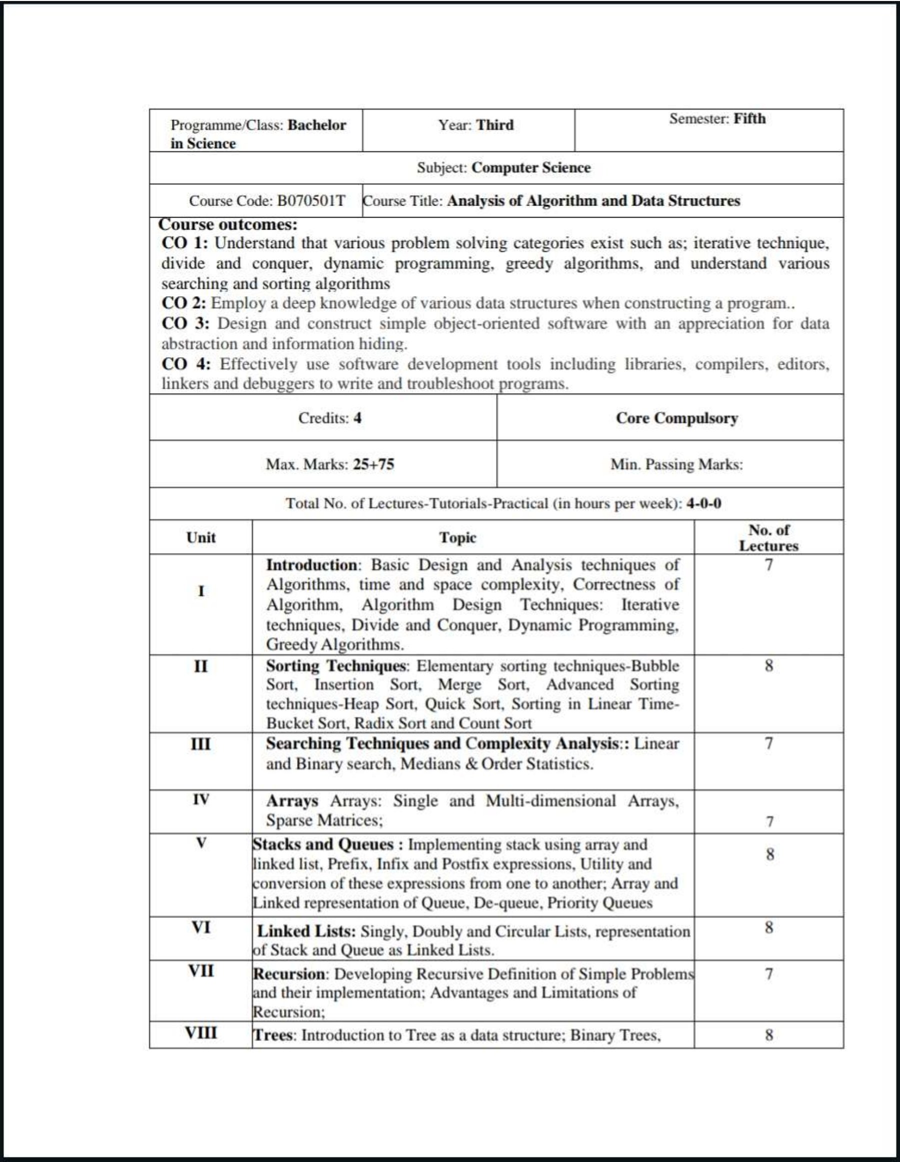


Programme/Class: **Bachelor in Science**	Year: **Third**	Semester: **Fifth**
Subject: **Computer Science**		
Course Code: B070501T	Course Title: **Analysis of Algorithm and Data Structures**	

Course outcomes:

CO 1: Understand that various problem solving categories exist such as; iterative technique, divide and conquer, dynamic programming, greedy algorithms, and understand various searching and sorting algorithms

CO 2: Employ a deep knowledge of various data structures when constructing a program..

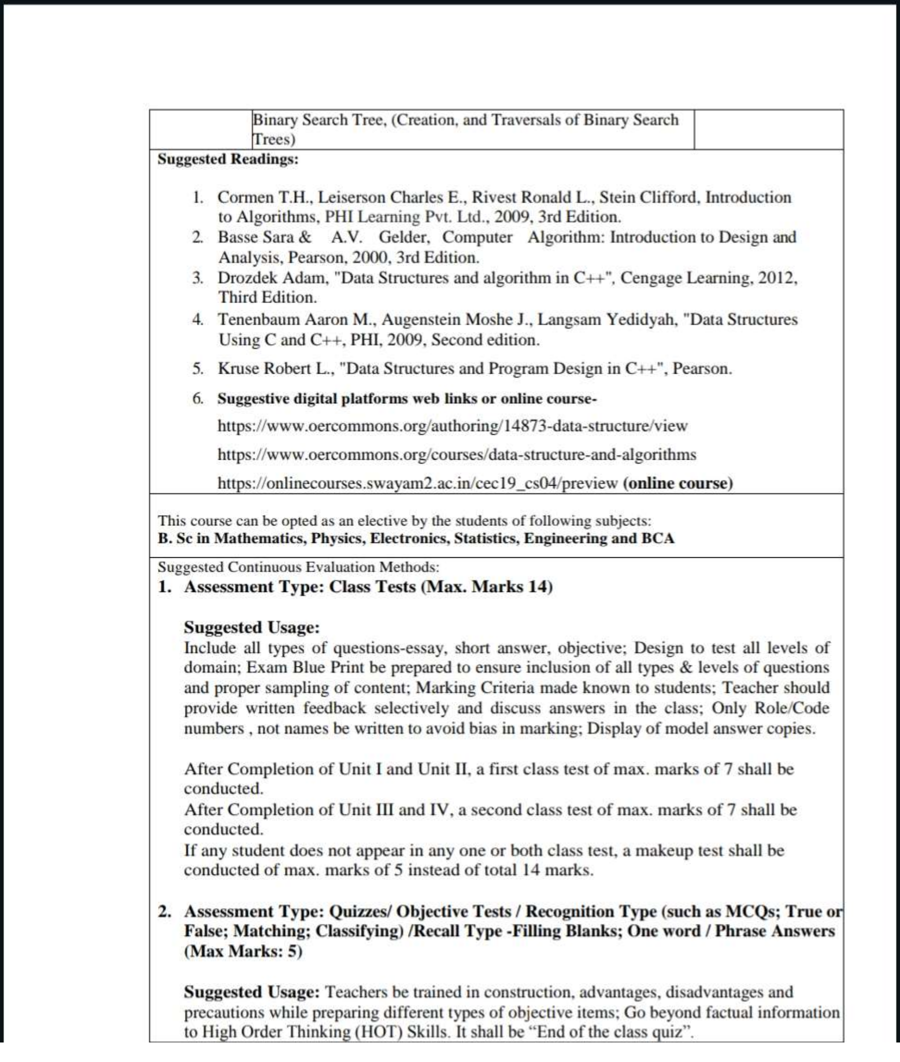
CO 3: Design and construct simple object-oriented software with an appreciation for data abstraction and information hiding.

CO 4: Effectively use software development tools including libraries, compilers, editors, linkers and debuggers to write and troubleshoot programs.

Credits: **4**	**Core Compulsory**
Max. Marks: **25+75**	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): **4-0-0**

Unit	Topic	No. of Lectures
I	**Introduction**: Basic Design and Analysis techniques of Algorithms, time and space complexity, Correctness of Algorithm, Algorithm Design Techniques: Iterative techniques, Divide and Conquer, Dynamic Programming, Greedy Algorithms.	7
II	**Sorting Techniques**: Elementary sorting techniques-Bubble Sort, Insertion Sort, Merge Sort, Advanced Sorting techniques-Heap Sort, Quick Sort, Sorting in Linear Time-Bucket Sort, Radix Sort and Count Sort	8
III	**Searching Techniques and Complexity Analysis**:: Linear and Binary search, Medians & Order Statistics.	7
IV	**Arrays** Arrays: Single and Multi-dimensional Arrays, Sparse Matrices;	7
V	**Stacks and Queues :** Implementing stack using array and linked list, Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Array and Linked representation of Queue, De-queue, Priority Queues	8
VI	**Linked Lists:** Singly, Doubly and Circular Lists, representation of Stack and Queue as Linked Lists.	8
VII	**Recursion**: Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion;	7
VIII	**Trees**: Introduction to Tree as a data structure; Binary Trees, Binary Search Tree, (Creation, and Traversals of Binary Search Trees)	8



Suggested Readings:

1. Cormen T.H., Leiserson Charles E., Rivest Ronald L., Stein Clifford, Introduction to Algorithms, PHI Learning Pvt. Ltd., 2009, 3rd Edition.
2. Basse Sara & A.V. Gelder, Computer Algorithm: Introduction to Design and Analysis, Pearson, 2000, 3rd Edition.
3. Drozdek Adam, "Data Structures and algorithm in C++", Cengage Learning, 2012, Third Edition.
4. Tenenbaum Aaron M., Augenstein Moshe J., Langsam Yedidyah, "Data Structures Using C and C++, PHI, 2009, Second edition.
5. Kruse Robert L., "Data Structures and Program Design in C++", Pearson.
6. **Suggestive digital platforms web links or online course-**

   https://www.oercommons.org/authoring/14873-data-structure/view

   https://www.oercommons.org/courses/data-structure-and-algorithms

   https://onlinecourses.swayam2.ac.in/cec19_cs04/preview **(online course)**

This course can be opted as an elective by the students of following subjects:
B. Sc in Mathematics, Physics, Electronics, Statistics, Engineering and BCA

Suggested Continuous Evaluation Methods:

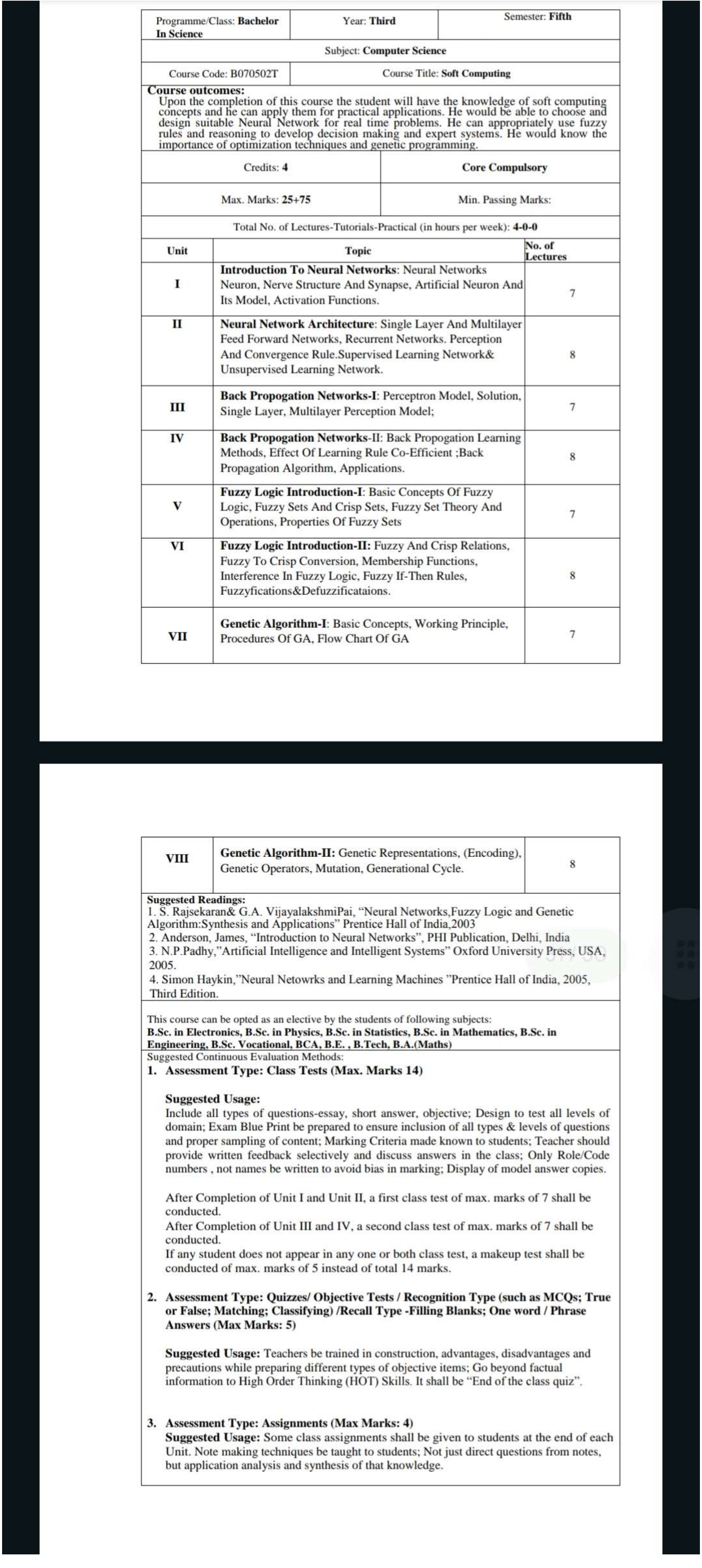
1. **Assessment Type: Class Tests (Max. Marks 14)**

   Suggested Usage:
   Include all types of questions-essay, short answer, objective; Design to test all levels of domain; Exam Blue Print be prepared to ensure inclusion of all types & levels of questions and proper sampling of content; Marking Criteria made known to students; Teacher should provide written feedback selectively and discuss answers in the class; Only Role/Code numbers , not names be written to avoid bias in marking; Display of model answer copies.

   After Completion of Unit I and Unit II, a first class test of max. marks of 7 shall be conducted.
   After Completion of Unit III and IV, a second class test of max. marks of 7 shall be conducted.
   If any student does not appear in any one or both class test, a makeup test shall be conducted of max. marks of 5 instead of total 14 marks.

2. **Assessment Type: Quizzes/ Objective Tests / Recognition Type (such as MCQs; True or False; Matching; Classifying) /Recall Type -Filling Blanks; One word / Phrase Answers (Max Marks: 5)**

   Suggested Usage: Teachers be trained in construction, advantages, disadvantages and precautions while preparing different types of objective items; Go beyond factual information to High Order Thinking (HOT) Skills. It shall be "End of the class quiz".



Programme/Class: **Bachelor In Science**	Year: **Third**	Semester: **Fifth**
Subject: **Computer Science**		
Course Code: B070502T	Course Title: **Soft Computing**	

Course outcomes:

Upon the completion of this course the student will have the knowledge of soft computing concepts and he can apply them for practical applications. He would be able to choose and design suitable Neural Network for real time problems. He can appropriately use fuzzy rules and reasoning to develop decision making and expert systems. He would know the importance of optimization techniques and genetic programming.

Credits: **4**	**Core Compulsory**
Max. Marks: **25+75**	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): **4-0-0**

Unit	Topic	No. of Lectures
I	**Introduction To Neural Networks**: Neural Networks Neuron, Nerve Structure And Synapse, Artificial Neuron And Its Model, Activation Functions.	7
II	**Neural Network Architecture**: Single Layer And Multilayer Feed Forward Networks, Recurrent Networks. Perception And Convergence Rule.Supervised Learning Network& Unsupervised Learning Network.	8
III	**Back Propogation Networks-I**: Perceptron Model, Solution, Single Layer, Multilayer Perception Model;	7
IV	**Back Propogation Networks**-II: Back Propogation Learning Methods, Effect Of Learning Rule Co-Efficient ;Back Propagation Algorithm, Applications.	8
V	**Fuzzy Logic Introduction-I**: Basic Concepts Of Fuzzy Logic, Fuzzy Sets And Crisp Sets, Fuzzy Set Theory And Operations, Properties Of Fuzzy Sets	7
VI	**Fuzzy Logic Introduction-II:** Fuzzy And Crisp Relations, Fuzzy To Crisp Conversion, Membership Functions, Interference In Fuzzy Logic, Fuzzy If-Then Rules, Fuzzyfications&Defuzzificataions.	8
VII	**Genetic Algorithm-I**: Basic Concepts, Working Principle, Procedures Of GA, Flow Chart Of GA	7
VIII	**Genetic Algorithm-II:** Genetic Representations, (Encoding), Genetic Operators, Mutation, Generational Cycle.	8

Suggested Readings:

1. S. Rajsekaran& G.A. VijayalakshmiPai, “Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications” Prentice Hall of India,2003
2. Anderson, James, “Introduction to Neural Networks”, PHI Publication, Delhi, India
3. N.P.Padhy,”Artificial Intelligence and Intelligent Systems” Oxford University Press, USA, 2005.
4. Simon Haykin,”Neural Netowrks and Learning Machines ”Prentice Hall of India, 2005, Third Edition.

This course can be opted as an elective by the students of following subjects:
B.Sc. in Electronics, B.Sc. in Physics, B.Sc. in Statistics, B.Sc. in Mathematics, B.Sc. in Engineering, B.Sc. Vocational, BCA, B.E. , B.Tech, B.A.(Maths)

Suggested Continuous Evaluation Methods:

1. **Assessment Type: Class Tests (Max. Marks 14)**

   Suggested Usage:
   Include all types of questions-essay, short answer, objective; Design to test all levels of domain; Exam Blue Print be prepared to ensure inclusion of all types & levels of questions and proper sampling of content; Marking Criteria made known to students; Teacher should provide written feedback selectively and discuss answers in the class; Only Role/Code numbers , not names be written to avoid bias in marking; Display of model answer copies.

   After Completion of Unit I and Unit II, a first class test of max. marks of 7 shall be conducted.
   After Completion of Unit III and IV, a second class test of max. marks of 7 shall be conducted.
   If any student does not appear in any one or both class test, a makeup test shall be conducted of max. marks of 5 instead of total 14 marks.

2. **Assessment Type: Quizzes/ Objective Tests / Recognition Type (such as MCQs; True or False; Matching; Classifying) /Recall Type -Filling Blanks; One word / Phrase Answers (Max Marks: 5)**

   Suggested Usage: Teachers be trained in construction, advantages, disadvantages and precautions while preparing different types of objective items; Go beyond factual information to High Order Thinking (HOT) Skills. It shall be “End of the class quiz”.

3. **Assessment Type: Assignments (Max Marks: 4)**
   Suggested Usage: Some class assignments shall be given to students at the end of each Unit. Note making techniques be taught to students; Not just direct questions from notes, but application analysis and synthesis of that knowledge.

Programme/Class: **Bachelor of Science**	Year: **Third**	Semester: **Fifth**
Subject: **Computer Science**		
Course Code: B070503P	Course Title: **Lab on Algorithm and Data Structures with C++**	
Course outcomes: **CO 1:** Optimize the solution with respect to time complexity & memory usage **CO 2:** Assess how the choice of data structures and algorithm design methods impacts the performance of programs. **CO 3:** Choose the appropriate data structure and algorithm design method for a specified application. **CO 4:** Solve problems using data structures such as linear lists, stacks, queues, binary trees, binary search trees and writing programs for these solutions		
Credits: **2**	Max. Marks: **25+75**	Min. Passing Marks:
Total No. of Lectures-Tutorials-Practical (in hours per week): **0-0-4**		

Practical List of on Analysis of Algorithms and Data Structures with C++:

1. Write a program that uses functions to perform the following:
   a) Create a singly linked list of integers.
   b) Delete a given integer from the above linked list.
   c) Display the contents of the above list after deletion.

2. Write a program that uses functions to perform the following:
   a) Create a doubly linked list of integers.
   b) Delete a given integer from the above doubly linked list.
   c) Display the contents of the above list after deletion.

3. Write a program that uses stack operations to convert a given infix expression into its postfix Equivalent, implement the stack using an array.

4. Write program to implement a double ended queue using
   i) array and
   ii) doubly linked list respectively.

5. Write a program that uses functions to perform the following:
   a) Create a binary search tree of characters.
   b) Traverse the above Binary search tree recursively in Postorder.

6. Write a program that uses functions to perform the following:
   a) Create a binary search tree of integers.
   b) Traverse the above Binary search tree non recursively in inorder.

7. Write program for implementing the following sorting methods to arrange a list of integers in ascending order:
   a) Insertion sort
   b) Merge sort
   c)

8. Write program for implementing the following sorting methods to arrange a list of integers in ascending order:
   a) Quick sort
   b) Selection sort

9. Write program to implement Insertion Sort (The program should report the number of comparisons)

10. Write program implement Merge Sort(The program should report the number of comparisons)

11. Write program implement Heap Sort (The program should report the number of comparisons)

12. Write program implement Randomized Quick sort (The program should report the number of comparisons)

13. Write program for creation and traversal of Binary Search Tree.