

SARDAR RAJA COLLEGE OF ENGINEERING, ALANGULAM

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

COURSE MATERIAL



SUBJECT NAME : PROGRAMMING AND DATA STRUCTURES - II

SUBJECT CODE : CS 6301

YEAR/SEM : II / III

BRANCH : B.E/CSE

STAFF NAME

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AP/CSE

CS 6301-PROGRAMMING AND DATA STRUCTURES - II

AIM

To understand the concepts of object-oriented programming and nonlinear data structures using C++.

OBJECTIVES:

The student should be made to:

- Be familiar with the C++ concepts of abstraction, encapsulation, constructor, polymorphism, overloading and Inheritance.
- Learn advanced nonlinear data structures.
- Be exposed to graph algorithms
- Learn to apply Tree and Graph structures

CS 6301 PROGRAMMING AND DATA STRUCTURES II

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UNIT I OBJECT ORIENTED PROGRAMMING FUNDAMENTALS

9

C++ Programming features - Data Abstraction - Encapsulation - class - object - constructors – static members – constant members – member functions – pointers – references - Role of this pointer –Storage classes – function as arguments.

UNIT II OBJECT ORIENTED PROGRAMMING CONCEPTS

9

String Handling – Copy Constructor - Polymorphism – compile time and run time polymorphisms –function overloading – operators overloading – dynamic memory allocation - Nested classes -Inheritance – virtual functions.

UNIT III C++ PROGRAMMING ADVANCED FEATURES

9

Abstract class – Exception handling - Standard libraries - Generic Programming - templates – class template - function template – STL – containers – iterators – function adaptors – allocators - Parameterizing the class - File handling concepts.

UNIT IV ADVANCED NON-LINEAR DATA STRUCTURES

9

AVL trees – B-Trees – Red-Black trees – Splay trees - Binomial Heaps – Fibonacci Heaps – Disjoint Sets – Amortized Analysis – accounting method – potential method – aggregate analysis.

UNIT V GRAPHS

9

Representation of Graphs – Breadth-first search – Depth-first search – Topological sort – Minimum Spanning Trees – Kruskal and Prim algorithm – Shortest path algorithm – Dijkstra's algorithm – Bellman-Ford algorithm – Floyd - Warshall algorithm.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Design problem solutions using Object Oriented Techniques.
- Apply the concepts of data abstraction, encapsulation and inheritance for problem solutions.
- Use the control structures of C++ appropriately.
- Critically analyse the various algorithms.
- Apply the different data structures to problem solutions.

TEXT BOOKS:

1. Bjarne Stroustrup, "The C++ Programming Language", 3rd Edition, Pearson Education, 2007.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 2nd Edition, Pearson Education, 2005

REFERENCES:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Second Edition, Mc Graw Hill, 2002.
2. Michael T Goodrich, Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", 7th Edition, Wiley Publishers, 2004.

MICRO LESSON PLAN

WEEKS	HOURS	TOPIC	TEXT BOOKS
I	UNIT I OBJECT ORIENTED PROGRAMMING FUNDAMENTALS		
	1	C++ Programming features(AV Class)	T1
	2	Data Abstraction - Encapsulation	T1
	3	Class - Object	T1
II	4	Constructors	T1
	5	Static Members – Constant Members	T1
	6	Member Functions	T1
	7	Pointers – References(AV Class)	T1
III	8	Role of this pointer – Storage Classes	T1
	9	Function as arguments	T1
	UNIT II- OBJECT ORIENTED PROGRAMMING CONCEPTS		
	10	String Handling	T1
	11	Copy Constructor	T1
	IV	12	Polymorphism - Compile time polymorphisms
13		Run time polymorphisms(AV Class)	T1
14		Function overloading	T1
15		Operator overloading	T1
V	16	Dynamic memory allocation, Nested classes	T1
	17	Inheritance(AV Class)	T1
	18	Virtual functions	T1
	UNIT III- C++ PROGRAMMING ADVANCED FEATURES		
	19	Abstract Class	T1
	20	Exception handling (AV Class)	T1
VI	21	Generic Programming - Templates	T1
	22	Class template - Function template	T1

VI	23,24	Standard libraries ,STL, Containers, Iterators	T1
	25	Function adaptors, Allocators	T1
	26	Parameterizing the class	T1
	27	File handling concepts(AV Class)	T1
VII	UNIT IV- ADVANCED NON-LINEAR DATA STRUCTURES		
	28	AVL trees	T2
	29	B-Trees	T2
	30	Red-Black trees(AV Class)	T2
	31	Splay trees	T2
VIII	32	Binomial Heaps	T2
	33	Fibonacci Heaps	T2
	34	Disjoint Sets	T2
	35	Amortized Analysis -Accounting Method(AV Class)	T2
IX	36	Potential Method – Aggregate Analysis	T2
	UNIT V- GRAPHS		
	37	Representation of Graphs	T2
	38	Breadth-first search	T2
X	39	Depth-first search(AV Class)	T2
	40	Topological sort	T2
	41	Minimum Spanning Trees	T2
	42	Kruskal and Prim algorithm	T2
XI	43	Shortest path algorithm- Dijkstra’s algorithm	T2
	44	Bellman-Ford algorithm(AV Class)	T2
	45	Floyd - Warshall algorithm	T2

Prepared By,
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