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| Department of Computer Science and Engineering | | LP: CS16301 |
| | | Rev. No: 00 |
| B.E/B.Tech/M.E/M.Tech : B.E(CSE) & B.Tech (IT) | | Regulation:2016 |
| PG Specialisation | : -- | Date:27-06-2017 |
| Sub. Code / Sub. Name | : CS16301 / PROGRAMMING AND DATA STRUCTURES II | |
| Unit | : I | |

Unit Syllabus: Object Oriented Programming Fundamentals

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 - String Handling.

Objective:

To familiarize with the C++ concepts of abstraction, encapsulation, constructor, polymorphism, overloading and Inheritance.

| Session No * | Topics to be covered | Ref | Teaching Aids |
|--|---|---|---------------|
| 1 | C++ Programming features - Data Abstraction - Encapsulation | 1–Ch.2; Pg.21-43 5–Ch.1; Pg.1-4 | BB/LCD |
| 2 | Class - object | 1-Ch.10; Pg.223-257 5-Ch.1; Pg.11-15 & Ch.1; Pg.313-319 | BB/LCD |
| 3 | Constructors | 1-Ch.10; Pg.226-228 5–Ch.11; Pg.364-380 | BB/LCD |
| 4 | Static members – constant members | 1-Ch.10; Pg.228-230 5–Ch.11; Pg.349-352, 393-397 | BB/LCD |
| 5 | Member functions Friend function and Friend Class | 1-Ch.10;Pg. 224-225, 238-240 5-Ch.10;Pg. 321-328, 342-349 | BB/LCD |
| 6 | Pointers | 1-Ch.5; Pg.87-88 5-Ch.10;Pg. 334-335 | BB/LCD |
| 7 | References- Role of this pointer | 1-Ch.5; Pg.97-100 5–Ch.10; Pg.336-341 & Ch.12; Pg.422-424 | BB/LCD |
| 8 | Storage classes | https://www.tutorialspoint.com/cplusplus/cpp_storage_classes.htm | BB/LCD |
| 9 | Function as arguments, Objects as functions argument. String handling | 1-Ch.7; Pg.143-147 1-Ch.3; Pg.48-49, 579-601 | BB/LCD |
| Content beyond syllabus covered (if any): Basic C++ Programs to understand the fundamentals of OOP Friend Function and Friend Class | | | |

* Session duration: 50 minutes

**Sub. Code / Sub. Name : CS16301 / PROGRAMMING AND DATA STRUCTURES II****Unit : II****Unit Syllabus:****Object Oriented Programming Concepts**

Dynamic memory allocation - Nested classes - Polymorphism – Compile time and Run time polymorphisms – Function overloading – Operator overloading - Inheritance – Virtual Functions - Abstract class.

Objective:

To familiarize with the C++ concepts of polymorphism, overloading and Inheritance.

| Session No * | Topics to be covered | Ref | Teaching Aids |
|--------------|---------------------------|---|---------------|
| 10 | Dynamic memory allocation | 1-Ch.6; Pg.127-130 5-Ch.12; Pg.400-408 | BB/LCD |
| 11 | Nested classes | 1-Ch.11; Pg.293 5-Ch.11; Pg.397-398 | BB/LCD |
| 12 | Polymorphism–compile time | 1-Ch.12;Pg. 312, | BB/LCD |
| 13 | Run time polymorphisms | 1-Ch.13;Pg.347 | BB/LCD |
| 14 | Function overloading | 1-Ch.7; Pg.149-153 | BB/LCD |
| 15 | Operator overloading | 1-Ch.11; Pg.261-297 5-Ch.13; Pg.432-464 | BB/LCD |
| 16 | Inheritance | 1-Ch.2;Pg.38-40, 1-Ch.15;Pg.390-402 5-Ch.14; Pg.499-568 | BB/LCD |
| 17 | Virtual functions | 1-Ch.2;Pg.36-37 5-Ch.15; Pg.570-594 | BB/LCD |
| 18 | Abstract class | 1-Ch.12; Pg. 313-314 5-Ch.15; Pg.585-588 | BB/LCD |

Content beyond syllabus covered (if any):

* Session duration: 50 mins



Sub. Code / Sub. Name : CS16301 / PROGRAMMING AND DATA STRUCTURES II
Unit : III

Unit Syllabus:**C++ Programming Advanced Features**

Generic Programming - Function template - Class template - Exception handling - Standard template libraries – containers – iterators – function adaptors – allocators - File handling concepts.

Objective:

To enhance the students' knowledge about the advanced features of C++.

| Session No * | Topics to be covered | Ref | Teaching Aids |
|--|--------------------------------------|--|---------------|
| 19 | Generic Programming | 1-Ch.2; Pg.40-42 5-Ch.3; Pg.90-92 | BB/LCD |
| 20 | Function template | 5-Ch.16; Pg.596-604, 610-614 | BB/LCD |
| 21 | Class template | 1-Ch.13; Pg.327-352 | BB/LCD |
| 22 | Exception handling | 1-Ch.14; Pg. 355-386 5-Ch.19; Pg.703-719 | BB/LCD |
| 23 | Standard libraries | 1-Ch.3; Pg. 45-64 | BB/LCD |
| 24 | STL – containers – iterators | 1-Ch.16;Pg.441-442, 1-Ch.19;Pg.550-561 | BB/LCD |
| 25 | Function adaptors | 1-Ch.18; Pg. 520-522 | BB/LCD |
| 26 | Allocators- Parameterizing the class | 1-Ch.19; Pg.567-577 | BB/LCD |
| 27 | File handling concepts. | 1-Ch.21; Pg.637-641 5-Ch.18; Pg.664-683, 691- 695 | BB/LCD |
| Content beyond syllabus covered (if any): | | | |

* Session duration: 50 mins



Sub. Code / Sub. Name : CS16301 / PROGRAMMING AND DATA STRUCTURES II
Unit : IV

Unit Syllabus:**Advanced non-linear Data Structures**

Trees – Binary Tree – Binary Search Tree - AVL trees – B-Trees – Splay trees – Heaps - Binomial Heaps– File indexing using B+ tree – Threaded binary tree – Huffman coding - Disjoint Sets

Objective:

To familiarize to tree and heap data structures.

| Session No * | Topics to be covered | Ref | Teaching Aids |
|--------------|--|---|---------------|
| 28 | Trees-Binary Trees | 2-Ch4; Pg.133-143 | BB/LCD |
| 29 | Binary Search Tree | 2-Ch4; Pg.144-154 | BB/LCD |
| 30 | AVL trees- Single Rotation, Double Rotation | 2-Ch.4; Pg.156-169 4-Ch.9; Pg.426-436 | BB/LCD |
| 31 | B-Trees – Definition, Basic operations | 2-Ch.4; Pg.179-184 3-Ch.18; Pg.434-452 | BB/LCD |
| 32 | Splay trees - operation | 2-Ch.4; Pg.169-178 | BB/LCD |
| 33 | Heaps- Binomial Heaps - Operations | 2-Ch6; Pg. 233-240 2-Ch.6; Pg.259-270 3-Ch.19; Pg.455-471 | BB/LCD |
| 34 | File indexing using B+ trees | 3-Ch.18; Pg-439 | BB/LCD |
| 35 | Threaded binary tree | 2-Ch4; Pg. 200 | BB/LCD |
| 36 | Huffman coding | 2-Ch 10; Pg. 433-439 | BB/LCD |
| 37 | Disjoint Sets- Dynamic Equivalence Problem- Basic data structure – Smart Union Algorithms | 2-Ch.8; Pg.335-345 3-Ch.21; Pg.498-509 | BB/LCD |

Content beyond syllabus covered (if any):

* Session duration: 50 mins



Sub. Code / Sub. Name : CS16301 / PROGRAMMING AND DATA STRUCTURES II
Unit : V

Unit Syllabus:**Graphs**

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 - Euler circuit - Travelling salesman problem - Biconnectivity – Network flow problem

Objective:

To expose to graph algorithms and to learn to apply Tree and Graph structures.

| Session No * | Topics to be covered | Ref | Teaching Aids |
|--------------|--|---|---------------|
| 38 | Representation of Graphs | 2-Ch.9; Pg.359-362 3-Ch.22; Pg.527-530 | BB/LCD |
| 39 | Breadth-first search – Depth first search | 2-Ch.9;Pg.398-410 3-Ch.22; Pg.531-544 4-Ch.12; Pg.595-610 | BB/LCD |
| 40 | Topological sort | 2-Ch.9; Pg.362-365 3-Ch.22; Pg.549-551 | BB/LCD |
| 41 | Minimum Spanning Trees – Prim’s algorithm,Kruskals algorithm | 2-Ch.9; Pg.392-398 3-Ch.23; Pg.567-573 4-Ch.12; Pg.639-646 | BB/LCD |
| 42 | Shortest path algorithm | 2-Ch.9; Pg.365-371 3-Ch.24; Pg.592-593 | BB/LCD |
| 43 | Dijkstra’s algorithm | 2-Ch.9; Pg.371-380 3-Ch.24; Pg.595-596 4-Ch.12; Pg.627-632 | BB/LCD |
| 44 | Bellman-Ford algorithm Floyd-Warshall algorithm. | 3-Ch.24; Pg.588-591 3-Ch.24; Pg.629-634 | BB/LCD |
| 45 | Euler circuit-Travelling Salesman Problem Biconnectivity-Network flow problem | 2-Ch.9; Pg.405-407 2-Ch.9; Pg. 401-404 2--Ch.9; Pg. 387-390 | BB/LCD |

Content beyond syllabus covered (if any):

* Session duration: 50 mins



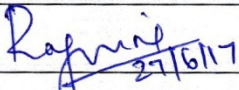
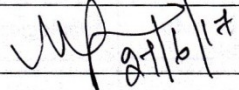
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REFERENCES:**Text Books:**

1. Bjarne Stroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley Professional, 2013.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 4th Edition, Pearson Education, 2014

References:

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

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| Designation | AP/CS | HOD/CS |
| Date | 27.06.2017 | 27.06.2017 |
| Remarks* : | | |
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