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|-----------------------------|------------------------------------------------|----------|----------|----------|----------|
| <b>MA 5105</b>              | <b>Computer Programming and Data Structure</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| M.Sc. First Semester (Core) |                                                | 3        | 0        | 2        | 4        |

**Computer Programming in C/C++:** Control statement and Loops, Functions, Arrays, Subroutines, Character Strings, Structures, Pointer data type and its applications.

**Data Structure:** Introduction to data types, Data structures, linear and Multi-dimensional Arrays, Pointers, Linked Lists, Stacks, Queues, Complexity algorithms, Singly linked lists, Doubled linked lists, Circular linked lists, Application of Linked Lists, Introduction to complexity of algorithm, Non-linear data Structure, Graphs, Various representation of graphs, Trees: binary trees, red-black trees, AVL tree, B tree, B+ tree, Spanning tree.

**Shorting Algorithms:** Bubble sort, Selection sort, Insertion sort, Shell sort, Quick sort, Heap sort, Radix sort, Searching Algorithms: Linear Search, Binary Search, Hashing.

#### **Text Books/ References:**

1. Balagurusamy, E.: Programming In ANSI C, McGraw Hill Education, 7<sup>th</sup> Edition, 2016.
2. Hubbard, J.R.: Schaum's Outline of Programming with C++, The McGraw Hill company Inc., 2<sup>nd</sup> edition, 2000.
3. Kernighan, B. W. and Ritchie, D.M.: The C Programming Language, Pearson, 2<sup>nd</sup> edition, 2015.
4. Tremblay, J.P. and Sorenson, P.: An Introduction to Data Structures with Applications, McGraw Hill, 1985.
5. Horowitz, E. and Sahni, S.: Fundamentals of data structures, Galgotia Publications, 2008.
6. Stroustrup, B.: The C++ Programming Language, Kindle Edition, 4<sup>th</sup> Edition, 2013.
7. Kanetkar, Y.: Understanding Pointers in C & C++, 5<sup>th</sup> edition, BPB Publications, 2018.
8. Sinha, P.K.: Computer Fundamentals concept, 6<sup>th</sup> edition, BPB Publication, 2003.
9. Kernighan, B.W. and Ritchie, D.M.: The C Programming language, Pearson Education, 2015.
10. Kanetkar, Y., Let us C, 3rd edition, BPB Publication, 2007.
11. Padmanabham, P., C & Data structures, B.S. Publications, 2012.

#### **COs:**

1. Ability to write computer programme independently for a specified objective.
2. Skill to identify the problems on linear and non-linear data structure and applying different approaches to solve them.
3. Articulate the need to develop algorithms and designing programme by using sophisticated programming skills.
4. Capability to handle different shorting algorithms.
5. Apply various sorting, searching and hashing techniques and their performance comparison.