Module 1 : Linear Data Structures and Applications

Relevant Course: Data Structures and Algorithms

Relevant Department: Computer Engineering; Information Technology

Relevant Semester: Ideally in Semester 3 of 4 year B E / B Tech

Prerequisite: Familiarity with Programming in C / C++; basics of algorithms

Topic Description:

· Introduction to stack and queue data structures. Basic operations on these data structures; array implementation; problem solving using these structures.

· Linear list data structure, basic operations on a singly linked list: traversal(), length(), insertion(), deletion(), merge(); search(); sort(); time complexity of each operation.

· Dynamic memory based implementation : concepts of pointer, array of pointers, structure, class and dynamic memory allocation. Designing programs in C and C++ for representation and manipulation of stack, queue and list using singly linked data structure.

· Applications of stacks, queues and lists in problem solving – (a) balanced parentheses, (b) expression evaluation, (c) scheduling of processes, (d) sparse polynomial manipulation : addition and multiplication, and (e) arithmetic with long positive integers.